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Products Finishing Contents

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Editorial 13

Mechanized Porcelain Enameling of Steel Tubs..... 14
By Fred M. Burt

Take Guesswork Out of Metal Identification..... 30
By George Black

How Tank Capacity Affects Galvanizing Cost..... 42
By Wallace G. Imhoff

Barrel Finishing of Metal Products
By H. Leroy Beaver

Part 21—The Application of Ceramic Barrels to the Finishing of Metal Products..... 58

Finishing Clinic
By Dr. Allen G. Gray

—Mechanism of Chromium Plating and Characteristics of Deposits 70

—Formation of Black Oxide Coatings on Ferrous Articles 84

—Passivity of Corrosion Resistant Alloys..... 86

—Spray Versus Brush Application on Exterior Steel Surfaces 90

News of the Industry 94

Finishes That Aid in Appearance and Utility.....108

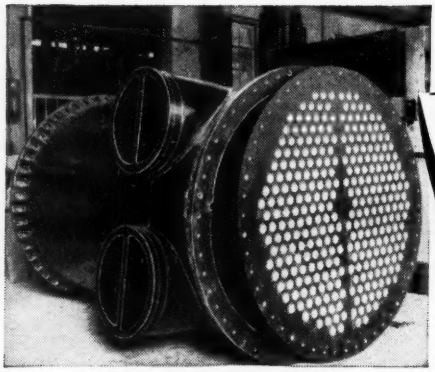
New Equipment and Materials 110

The Finishing Touch 132

Opportunity Section 133

Catalog Library 134

Index to Advertisements 136



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Products Finishing

Finishing Control

UNIFORMITY of product is important in all successful production operations and is necessary for repeat business. Control is the basis of uniformity of product and extends even to uniformity of finish of products. The control of organic finishing materials begins with the adoption of the specific materials to be used and a thorough understanding between the supplier and the purchaser. During the negotiation for samples and the development of organic coatings for specific uses, the prospective supplier should be given full information as to the kind of product to be finished and service conditions under which it is to be used, as well as the kind of finish desired. Before final approval of materials, it is sometimes well that an agreement be reached between the supplier and purchaser as to the various physical, application, and durability properties and even on such matters as the proper identification of shipping containers. The supplier should also agree that no changes in formulation will be made without advising the purchaser as to the reason and nature of the change.

With respect to the uniformity of organic finishing materials which are produced today, the consumer is in a fortunate position. Not so many years ago, it was somewhat a matter of conjecture to both the manufacturer and user as to whether two batches of a finishing material could be depended upon to have the same characteristics and properties. Today, however, the uniformity of most lacquers, enamels, and other finishing materials is assured. This is due in a large part to the fact that equipment and scientific control have been vastly improved. Thus, there is no longer any guesswork about manufacturing procedure since each step can be carefully checked and easily duplicated. The next few years should see even further advances in the manufacture of uniform finishing materials.

Mechanized Porcelain Enameling of Steel Tubs

By FRED M. BURT

WITH nearly one-half mile of overhead conveyors designed to handle workpieces as large as bath tubs, the porcelain enameling department of Norris Stamping & Mfg. Co., Los Angeles, is operated with a maximum number of mechanical handling units around what is believed to be the world's largest U-type continuous furnace. This department was designed specifically for the large-scale production of enameled steel bath tubs, sinks, washing machine tubs, and other large units. The enameling department covers a 120 x 260-foot area in the west end of one of the three parallel building divisions (each over 700 feet long). An overhead ramp and mezzanine provide additional floor space.

Fig. 1—This view of the Norris porcelain enameling department shows the office-laboratory (left); milling and slip storage areas; frit storage, and weighing facilities on the mezzanine; Rotospray and milled enamel storage tanks (right); and a section of ground coat dryer conveyor.

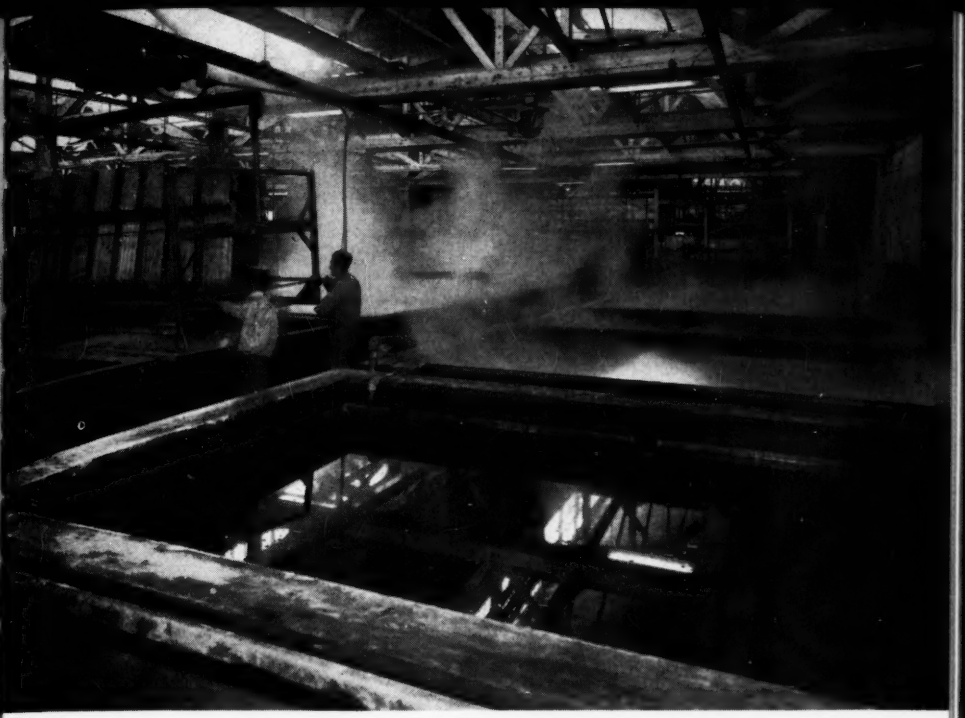


Fig. 2—In this view of the cleaning and pickling section of the Norris porcelain enameling department, a cleaning cold rinse tank and acid tank are shown in the foreground. At the left, eight bath tubs in a Monel metal pickle basket are shown about to be lowered into a pickling tank.

The frit used in the porcelain enameling department is hauled to a door near one corner in trucks or freight cars. Bulk storage is on the main floor, but operating storage of frit and other mill additions is on the 16-foot-elevation mezzanine of steel grating over the frit mills with openings and chutes for mill charging. A Richards-Wilcox continuous conveyor with bag hooks is used to move the supplies on the mezzanine. Conveniently located on the mezzanine are a large Toledo scale and a small W. T. Higgins Detectogram scale for small portions, and several painted barrels for clay, borax, sodium nitrate, magnesium carbonate, potassium carbonate, and so on, as shown in Fig. 1.

Adjoining the mezzanine on a lower level is a platform supporting six milled enamel storage tanks with discharge valves. The five larger ones, each of which has a capacity of approximately 10 tons, are for ground coats, white cover coats, and acid-resistant enamel. The smaller three-ton tank is for black edging or reinforcing enamel.

The 60-gal. pressure tanks used are transported on lift-truck pallets and are filled from the tank valves through a Rotospray. Two of the Patterson mills under the mezzanine are 2,000-lb. capacity units, 5 feet in diameter x 6 feet long. The third one is of 500-lb. capacity and is 3 feet in diameter x 4 feet long. These mills are filled with a proper combination of one and two-inch porcelain balls. Between the smaller mill and the first large one is a Neptune water meter, with hose and reel for mill charging. The meter is designed to register up to 500 gallons

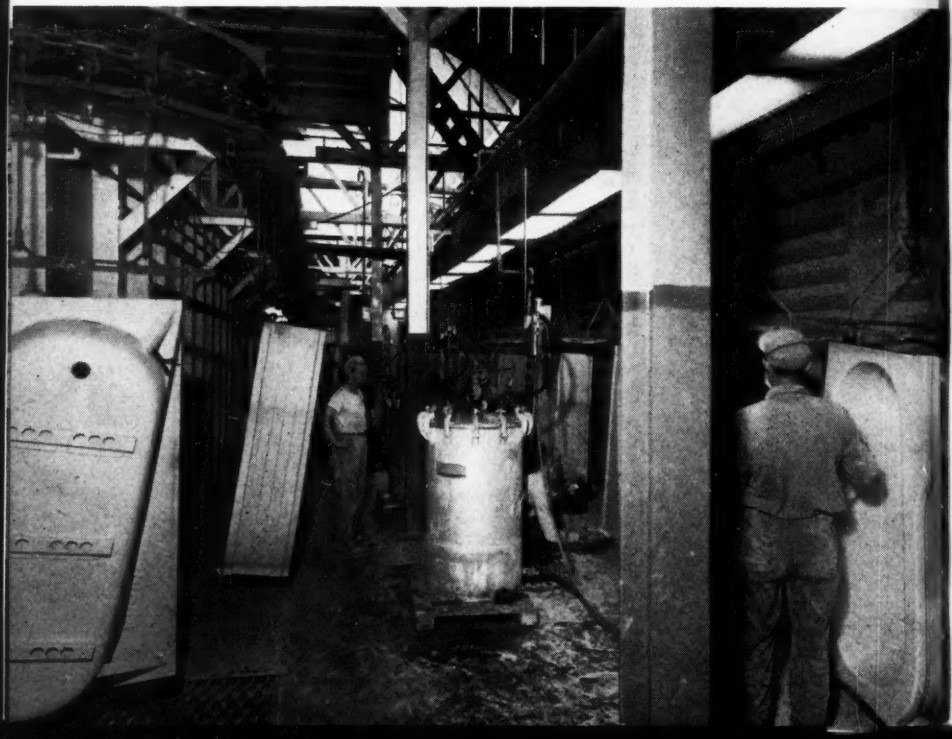
and has an automatic action. A pointer on its dial is set at the number of gallons desired, and when this quantity of water has passed through the meter, it is shut off. A heavy three-inch rubber hose in easily joined sections is used for the discharge of enamels from mills to storage tanks at a controlled air pressure in the mills of 5 p.s.i. A nearby 18 x 18-foot office and control laboratory contains a Rotap machine for determining the fineness of mill grinds, as well as equipment for the titration control of the cleaner, neutralizer, and acid solutions.

Norris is currently producing steel bath tubs for Sears, Roebuck & Company at a rate of 700 units daily and washing machine tubs at a rate of 1,400 to 1,500 daily for the Hurley Machine Division of Electric Household Utilities Corporation. Operation is confined to five 8-hour days each week.

The production of the bath tubs involves some very interesting operations. A 6,000-ton Lake Erie Hydraulic press fabricates the tubs from 0.077-inch deep-drawing Toncan enameling stock. After trimming, the tubs, together with the drawn aprons, legs, gussets, and feet, are delivered to one corner of the enameling department where the parts are assembled by welding. A roller conveyor is used to carry the welded tubs through an inspection area, along the wall past the ground coat spray booth to the pickle loading area.

The ten 5,000-gal. tanks in the pickling department, illustrated in Fig. 2, are constructed of steel plate and are 10 x 14 feet x 7 feet deep. The first three tanks are for boiling alkaline cleaner, each tank being heated by

Fig. 3—In this illustration, the first spray station in the ground coat spray booth is shown at the right, while at the left appears the rear end of the Ferro firing furnace with the furnace line carrying ground coat tubs which have been dried.



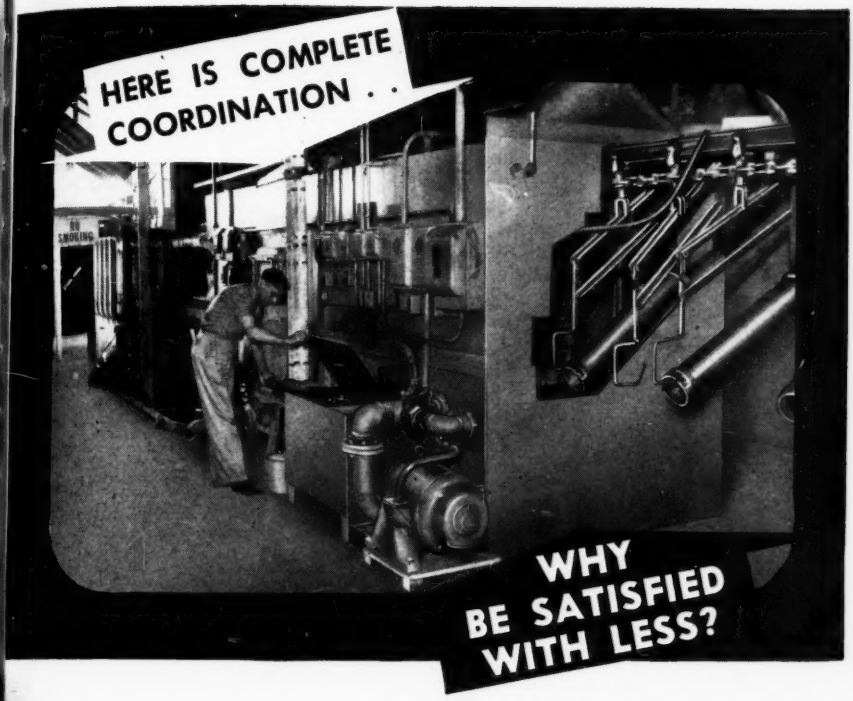


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Fig. 4 — This illustration provides a view of two of the three-pass lines in the 120-foot long ground coat dryer in the Norris porcelain enameling department. Note the floor ducts through which hot air is admitted and overhead ducts which carry humid air away for recirculation.

450 feet of 2-inch steam pipe carrying steam at 80-lb. pressure. The location of the pipes between the outer walls and inner steel baffle plates, each with three horizontal rows of 3-inch holes, causes the building up of a pressure that provides a constant, vigorous bath agitation. The fourth tank is a hot water rinse and the fifth a cold rinse. The sixth and seventh tanks contain sulphuric acid at about 7 per cent concentration maintained at about 150 deg. F. Heat is supplied by steam circulated in lead pipe coils. These tanks

Fig. 5—Tubs sprayed with ground coat descend from the dryer and are provided with nickel-chrome supports for travel though the firing furnace. Prior to entering the furnace, the tubs travel through a 10-foot booth for reinforcing or touch-up.

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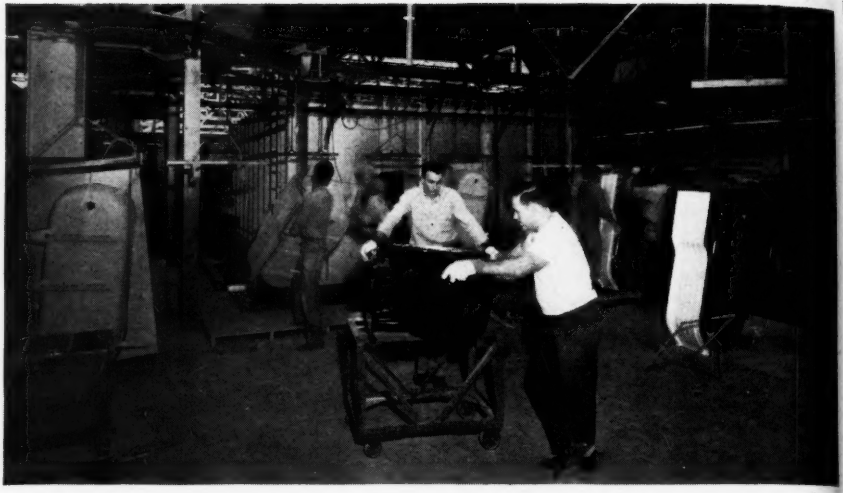

Fig. 6—In the foreground, inspectors are shown examining a bath tub after ground coat firing. In the background, operators are shown replacing the fired tub with an unfired one.

are lead-lined and are coated on the outside with an acid-resisting asphalt paint. An inner framework liner of redwood protects the lead lining from contact with the pickle crates. The eighth tank in the pickling department is a hot water rinse. The ninth is a neutralizer tank, similar to the cleaner tanks, containing a 90 per cent soda ash and 10 per cent borax combination to maintain a constant sodium oxide concentration of 0.3 to 0.4 per cent and operated at 150 deg. F. The tenth, or dryer, tank has three rows of evenly spaced gas burners, each with three close, parallel rows of jets. They are situated close to the steel floor, eight inches below heavy, 12-inch wide, diamond steel baffle plates. A little higher up are steel supports to hold the ware crates.

Overhead in the center of the area is a reel for a 40-foot flexible electric cable to feed current to the electric hoist that travels around the endless monorail centered over each row of tanks and extending over a service area at the unloading end.

After being pickled, tubs are hung on the ground coat conveyor chain. The ground coat conveyor chain enters the ground coat spray booth close to the pickle room unloading area. With a variable speed, the chain is set at 7 feet per minute and the tubs are hung 4 feet between centers as shown in Fig. 3. The Acme water wash booth for ground coat is 60 feet long x 9 feet high and has a 7-foot working depth and 16-foot overall depth. It is well lighted by 12 overhead, 48-inch fluorescent, open-end lighting fixtures, each arranged for three 40-watt lamps mounted over 12 x 54-inch polished wire glass panels backed by porcelain enameled reflectors.

The enamel spray line includes six water wash units with air drawn through them by three blowers connected to 15 h.p. motors and drawing out a total of 110,000 cubic feet of exhaust stream air per minute. In front of each water wash unit is a double-hinged baffle of galvanized steel, which reclaims a large percentage of the enamel overspray before it enters

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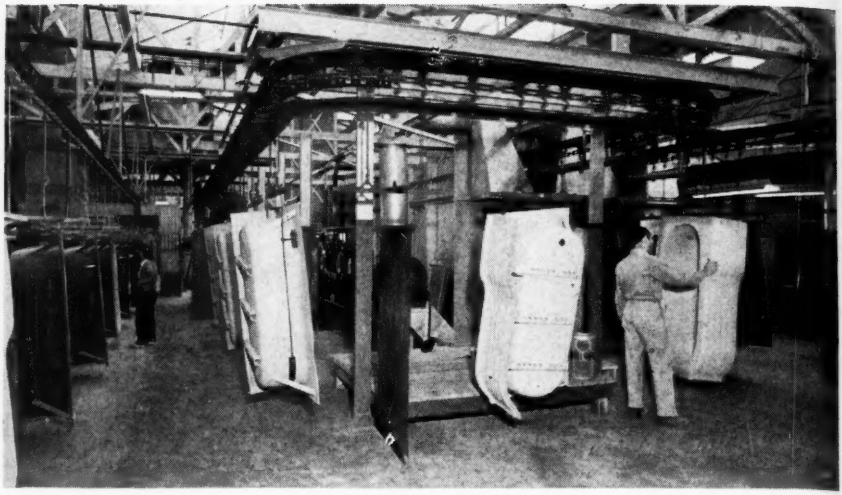

Fig. 7—At the left, bath tubs are shown emerging from the ground coat spray booth. At the center, ground coat tubs are shown being conveyed from the rear loading area alongside the firing furnace. Note the stainless steel baffles between the tubs. The furnace exit line is shown at the extreme right.

the water wash section. The baffles are designed so that they can be swung open for cleaning on both sides at once.

Four gage-regulator-filter units provide control of air-line pressure and enamel tank pressure for spraying. At the exit end, centered under the conveyor, is a 6-foot long pit with fluorescent lights and spray attachments in which an operator stands to spray the undersides of the bath tubs. The length of the pit permits the spraying to be done on a slant so that the sprayer does not have to assume an uncomfortable position.

The ground coat chain, after leaving the booth, travels for some distance through three 90-deg. turns to an upper level for a three-pass travel through the ground coat dryer illustrated in Fig. 4. This 20 x 120 x 12-foot high oven is separated from the 20 x 100-foot cover coat dryer by a two-inch wall. Both dryers are enclosed by a double sheet steel wall of panels containing 4 inches of rockwool insulation, and are situated 16 feet above floor level. A system of ducts provides for admission of hot air at the bottom of each dryer which is sucked out at the top through other ducts for recirculation through the heater. Outer air is drawn in through ducts at the open ends to provide a seal against heat loss and to add fresh air to the humid air in the dryer.

The heater equipment is located on a mezzanine beneath the dry rooms and consists of two Petr-O-Fire units using No. 300 standard fuel oil. The burners fire into large diameter, stainless steel tubes in which the hot gases mix with the circulating air to give it the power Micromax-controlled temperature before the blowers move it on up to the distribution pipes in the dryer floor ducts. The ground coat heating equipment has a capacity of 2,500,000 B.T.U. input per hour, the white coat heating equipment, 2,000,000 B.T.U.

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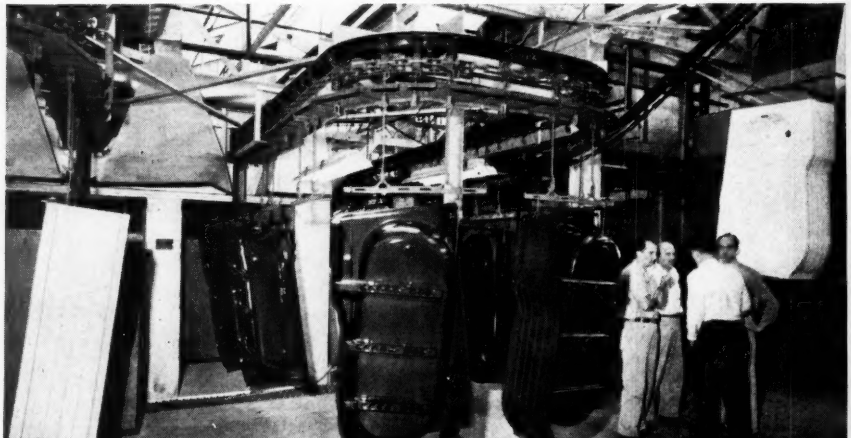
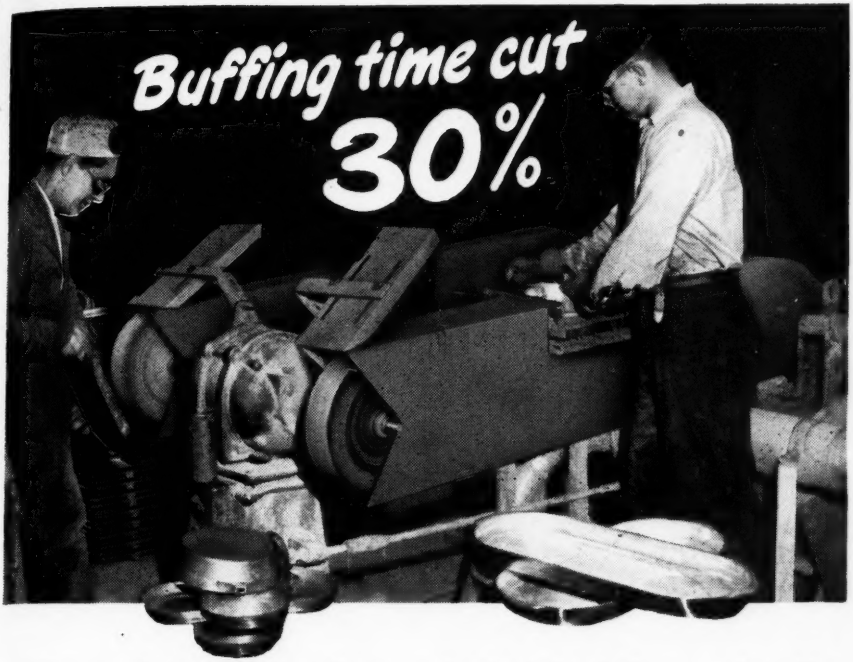
the tubs drop down to the lower level, as shown in Fig. 5, where they are inspected and a workman attaches the nickel-chrome bands that will be used in carrying them after transferal to the furnace chain. The tubs then travel through another Acme water wash booth, 10 feet wide x 9 feet high with a 7-foot working depth, where any uncovered areas are sprayed and the black edging or reinforcing spray is applied to the proper edges.

Slightly beyond this spray booth, at the rear of the Ferro furnace, is the transfer station where two operators disengage the tubs from the ground coat chain hangers and hang them on the furnace line with the hangers that have just been inserted as shown in Fig. 6. The unfired tubs then travel along the side of the furnace, parallel to the ground coat spray line, to the front of the furnace where they turn and enter, as illustrated in Fig. 7. This furnace has an overall length of 103 feet and is believed to be the largest U-type furnace in the world. The burning chamber is 33½ feet long x 20 feet wide, with 50 feet of travel in the burning zone. The 500-foot long conveyor chain, driven by a variable speed motor (limits, 3 to 25 feet per minute), accommodates units to be burned up to 7 feet in the vertical dimension. The width limit on the horizontal plane is approximately 40 inches.

The full muffle furnace is cross-fired by five North American combination gas-oil burners on one side and four on the other, with a total capacity of 9,000 cubic feet of natural gas or 9,000,000-plus B.T.U. hourly input to give a thermal capacity for 12,000 lb. of metal per hour in addition to the burning fixtures. Each burner is connected to the Petr-O-Fire standby system using oil, and the changeover can be made as quickly as one fuel can be turned off at each burner and the other one turned on. Close heat control is maintained and recorded by two Micromax recorder-controllers connected

Fig. 8—Cover-coated tubs are shown entering the firing furnace at the left, and fired units are shown emerging from the furnace at the right. The bath tub ascending at the right is on the cooling line.





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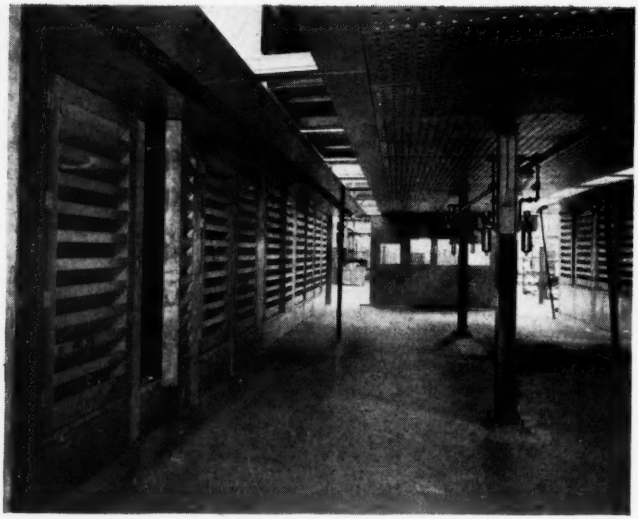

Fig. 9 — This illustration shows a view of the cover-coat spray room at Norris before completion. Note the five water wash units with double hinged baffle doors located on each side of the room.

to two thermocouples, one on each side of the burning zone.

To reduce heat loss and thereby cut fuel consumption in this extremely high side-wall furnace, stainless steel sheets are hung from each fifth hanger to serve as baffles, thus dividing the furnace up into heating zones. Tests show that these baffles have raised the furnace temperature about 200 degrees.

Paralleling the furnace chain after it leaves the exit end and travelling back along the side of the furnace is the cooling conveyor line, shown in Fig. 8. Tubs fired in any coat emerge from the furnace cool enough so that workers with asbestos gloves can transfer the tubs the short distance necessary. After a long travel, even out of the department in a long elevated double pass, the cooling line returns to a point of transfer to the finish coat line just before its entry into the finish coat spray booth.

The 40 x 48-foot cover coat spray room is glass enclosed and lighted by 20 three-lamp fluorescent fixtures overhead. It contains five Acme water wash spray units with double baffle doors on each side, as shown in Fig. 9. On one side of the room is the overhead chain of the finish coat line used to carry bath tubs and sinks. On the other side is a lower level, specially designed line for washing machine tubs which, as they are carried to the exit end, automatically revolve for overall spraying inside and out. The end of the line, just outside of the spray room, is close to the finish overhead line where it comes out of the other side of the booth and turns at a 90-deg. angle. A little farther on this line turns at 180 deg., then rises on a gentle slope to the higher level, to turn again and enter the finish drying oven. After three passes through this dryer, the line drops to the lower level to pass through an area where inspection, touch-up, and/or edging work can be performed. Beyond this the line parallels the furnace line for 40 feet so that parts may be transferred to the furnace line for firing.

Except for the continuous furnace installation, made by the Ferro Enamel Corporation of California, the conveyor lines and dryers were engineered by Industrial Systems, Inc., Los Angeles. The water wash spray booths were designed and installed by Acme Associates, Inc., Los Angeles.

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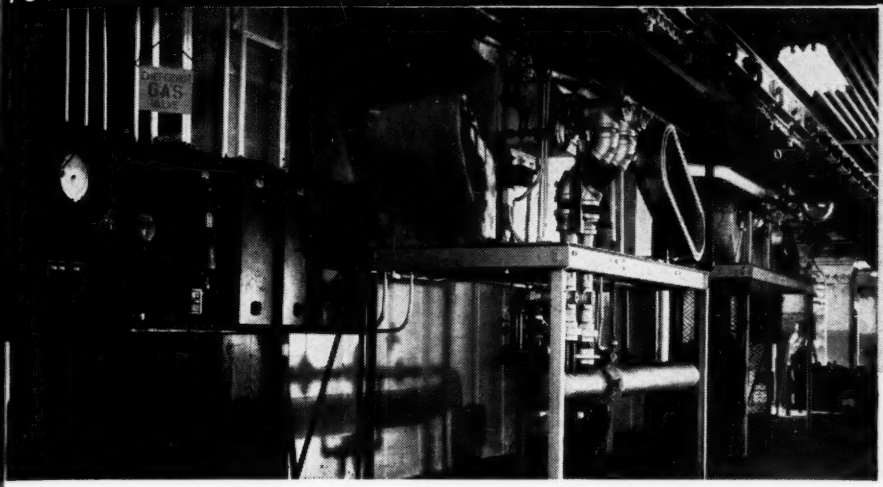

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A Finishing System in any industry, regardless of product or finish, is only as good as the planning and the coordination engineered into it. To produce the desired results, equipment for each phase of the finishing process—from metal cleaning through to final coat baking—must be carefully planned and coordinated with respect to production layout and requirements. No two installations are identical. That is why so many manufacturers turn to Mahon for finishing equipment to produce the finest results . . . they do so with complete confidence, because they know that twenty-seven years of experience in this highly specialized field, backed by constant research and pioneering development, have endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available elsewhere. See Mahon Insert in Sweet's Mechanical Industries File for complete information.

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MAHON

Take Guesswork Out of Metal Identification

The author discusses simplified methods for distinguishing aluminum from magnesium, bare from clad aluminum sheet, and corrosion resistant from carbon steel.

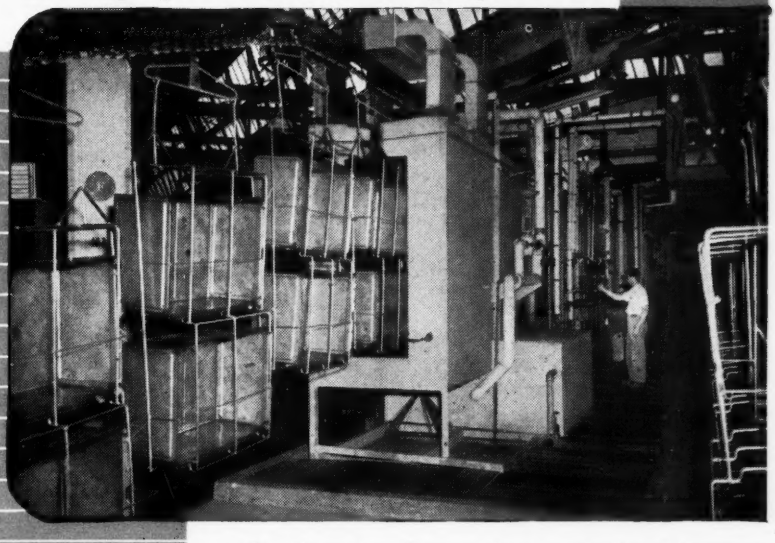
By GEORGE BLACK

ONE of the big problems facing personnel concerned with metal processing is the proper identification of the materials being processed. Laboratory personnel are well acquainted with identification methods, but for some reason or other, that information has a unique way of sticking close to home, and Mr. Average Plater seldom has more than his rule-of-thumb to guide him. The proof of this is to be found in scrap piles and on the lips of those who remember. Only too often has the author listened to tales that tell of the "lost" carbon steel job that accidentally found its way into the passivating tank, or of the magnesium fitting that "disappeared" when it was accidentally anodized along with aluminum fittings.

But not all of these tales end in the scrap pile. Errors in processing due to mistaken identification add up in time and labor losses, and that means money. Deadlines are pushed hard while stainless steel parts linger in plating baths, and clad aluminum, mistaken for bare sheet, clutters up precious anodizing space. Corrosion roads are opened and disassembly eats up time whenever bare aluminum or unplated steel are mistakenly riveted in place without necessary surface treatment. These are but a few of the possibilities or realities which result from a lack of knowledge or generally, from a lack of a simplified, systematized accessible presentation of the information known. It is the purpose of this article to outline methods to be followed in distinguishing the metals mentioned above. It is hoped that finishing executives will follow suit in passing this information on to their personnel in such a manner that it will be understood clearly and that each and every man assigned the responsibility of processing material will know how to identify it for his purposes as readily as he can tell his left from his right hand. In the long run time, labor, material, and anxiety will all be saved.

The increased use of magnesium alloy, especially by those firms which have been using aluminum, gives rise to our first difficulty. It is true that magnesium is lighter than aluminum, but the difference in weight when it

NO REJECTS DUE TO CLEANING
in this large porcelain enameling operation



PENNSALT CLEANERS clean deep drawn cold-rolled steel refrigerator liners prior to porcelain enameling

In this modern Eastern plant, producing refrigerators and home freezers, the porcelain enameling layout was especially designed to incorporate the latest equipment, including a 12-stage overhead conveyor-type spray washing machine.

Pennsalt Cleaners are used exclusively in this streamlined operation . . . in which parts can be on the way to assembly 1 hour and 45 minutes after they enter the washing machine. That calls for *efficient cleaning* . . . and efficient cleaning they get. In approximately a year, there have been *no rejects traceable to faulty cleaning*.

There are Pennsalt Cleaners for practically every type of metal cleaning. These products are concentrated, highly active, free-rinsing and long lasting. Pennsalt's technically trained representative will gladly study your set-up to see how Pennsalt Cleaners may give you better work at lower cost. Write to Special Chemicals Division, Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa.

PENN SALT
METAL CLEANERS

comes to small parts or sheet stock is not always a dependable guide. In fact, one could go so far as to say that it is no guide at all unless two parts, which are identical except for the material, are available for comparison at the same time.

There is no appreciable color difference between the two metals, and now that magnesium is being distributed in a wide variety of shapes and forms, the visual means of identification is most definitely not recommended. It is true, of course, that a great deal of the magnesium used is chrome-pickled prior to original storage, and in many instances the distinct yellowish tint of the treatment is still discernible when the parts reach the plating room. But this is not reliable, as the coating is easily removed during the cleaning operations which may have occurred during manufacture, and not all magnesium alloy is received so processed. Whenever the coating is observed, it can be reasonably assumed that the part in question is magnesium.

Let us suppose, however, that we have agreed not to trust our touch or our visual examination and that what we want is positive proof. We want to know, with guesswork eliminated, just which is which. The method for distinguishing aluminum from magnesium is indeed simple, involving the following materials:

1. Organic solvent
2. Water
3. Caustic soda
4. Nitric acid

Identification Procedure

1. Clean area to be tested, using organic solvent, brushes and/or rags.
2. Apply drop of caustic soda.
3. Observe reaction:

If metal is inert, material is magnesium. (Note: caustic soda will dissolve chrome-pickle coatings, but have no effect on magnesium.)

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If dissolution of material occurs, it is aluminum alloy.

4. Rinse thoroughly with clean water.

To Double Check

1. Clean area to be tested.
2. Apply drop of nitric acid.
3. Observe reaction:

If metal is inert, material is aluminum.

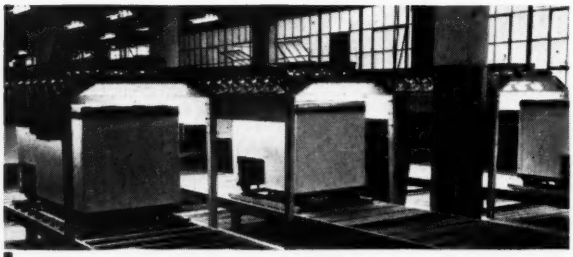
If dissolution occurs, material is magnesium.

4. Rinse thoroughly with clean water.

It is possible, of course, to do away with the spot test and to use convenient processing tanks. If this is done, it is recommended first that only a small area of the part being tested be immersed; and secondly, that the material being tested be removed as soon as gassing is evident. In no case should tests be conducted by immersion if close tolerance parts are being identified or if an assembled unit is being checked. So much for the distinction between aluminum and magnesium.

The use of bare aluminum alloy sheet in large quantities is causing considerable confusion among those who previously used only clad alloys. The bare material requires greater protection from the ravages of corrosion, whereas the clad sheet carries its own protection. In aircraft work, for example, clad sheet is usually used as received, whereas the bare material has to be anodized and primed.

All sheet aluminum is identified by the manufacturer with clearly imprinted legible inked letters. Thus, for sheet material which still bears the imprint of its material designation, no identification tests are necessary. Unfortunately, however, by the time the material reaches the finishing department, the identifying ink stamps are



HALL

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OVENS

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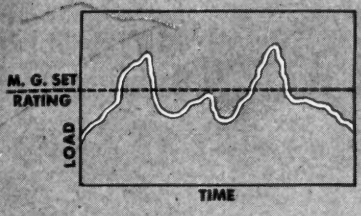
ELECTROPLATING FUNDAMENTALS— how reserve capacity affects plating costs



E.P. Motor-Generators safely handle short-time overloads.

"Reserve Capacity" means that Electroplaters get more amperes per dollar from E.P. Motor-Generators. These MG Sets provide an effective ampere capacity at least one-third greater than their nameplate ratings.

The typical electroplating shop load curve to the left illustrates the importance of this feature. By taking advantage of Reserve Capacity, you can safely select a Motor-Generator with a rating of only 75% of the peak loads.

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E.P. Motor-Generators are conservatively designed to provide more value for less overall cost.

why EP motor-generators are best . . . for every application

Every electrolytic process is a special generating problem. Ordinary commercial machines cannot meet the established requirements of dependability and long life demanded by electrolytic service.

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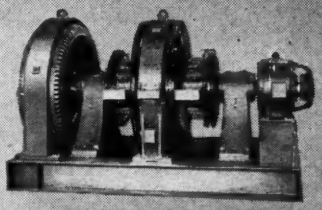
The Electric Products Company has, for 35 years, *specialized* in electrolytic generator design. Whatever the application, Electric Products Company will design a motor-generator especially to fit your requirements.

WRITE FOR BULLETIN 202. It describes the entire line of E. P. Motor-Generators for the Electrolytic Processes.



Every part of an E.P. Motor-Generator is readily reached for inspection and maintenance particularly important with relation to the bottom brushes. E.P. equipment requires no special protective equipment. Thirty-four years of operating experience prove that these Motor-Generators function safely under the extreme conditions common to most electrolytic operations.

EP X-23

THE ELECTRIC PRODUCTS COMPANY

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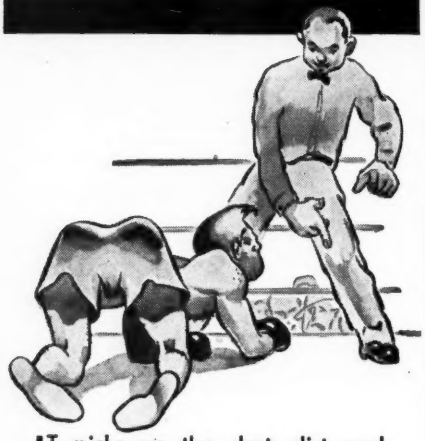

IT picks up the dust, dirt and specks that spoil paint jobs. It assures a pride-arousing finish job and a profitable one. Get them from your dealer or write us.

The Dust-All Tack Rag comes in the characteristic *Red Checkered Bag.*

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10614 Gratiot Ave., Detroit 13, Mich.

usually obliterated. It then becomes the problem of finishing personnel to decide whether the material on hand is bare or clad.

The same materials which serve to identify magnesium and aluminum in the tests described above are applicable for segregating bare from clad sheet. The nitric acid is not necessary, but may be used as a neutralizer when the examination is completed.

Identification Procedure

1. File a small area along the edge of the sheet to be tested.
2. Apply a drop of caustic soda.
3. Observe reaction:

If material is bare aluminum alloy sheet, reaction of caustic soda will turn edge completely black.

If material is clad aluminum alloy, reaction of caustic soda will leave black center banded by two white thin lines.

4. Rinse thoroughly with clean water.
5. Neutralize with nitric acid.
6. Rinse with clean water.

The spot test can be replaced with an immersion method if so desired, but the same precautions listed above under the method for segregating magnesium from aluminum must be followed. The attack on aluminum by caustic soda, especially when the solution is hot, is extremely severe.

The last of the three identification trouble makers is the differentiation between the S.A.E. (carbon) steels and the chrome-nickel corrosion resistant or stainless steels. Once again we find that the eye bears false witness. The materials required for this identification are:

1. Magnet
2. Nitric acid
3. Water

Identification Procedure

1. Place magnet in contact with part being tested.
2. Observe effect of magnet:

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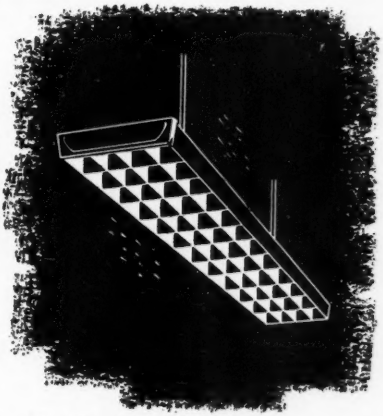

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BAKING TIME:
20 minutes at 300° F. or 7 minutes with Infrared. (Optional Schedules are available.) *Vedoc Reflector Gray, for channels and backs of reflectors, can be applied and baked at the same operation as the white.*

All Vedoc finishes are developed for a specific use, then slightly varied to best fit into each customer's setup. Write today for more information about these "better finishes". Also, ask for your copy of the new booklet, *A Review of Product Finishing with Organic Coatings.*

LIQUID PLASTICS DIVISION
FERRO ENAMEL CORPORATION
CLEVELAND 5, OHIO

If part is magnetic, the material is probably one of the carbon steels.

If part is non-magnetic, the material is one of the corrosion resistant steels.

To Double Check

1. Clean area to be tested.
2. Apply drop of nitric acid.
3. Observe reaction:

If material in inert, it is corrosion resistant steel.

If dissolution occurs, material is carbon steel.

4. Rinse with water.

Immersion rather than spot testing may be used if it is remembered that nitric acid attacks carbon steel vigorously. If carbon steel is immersed in nitric acid, it should be thoroughly rinsed with running water and then neutralized with a strong alkali.

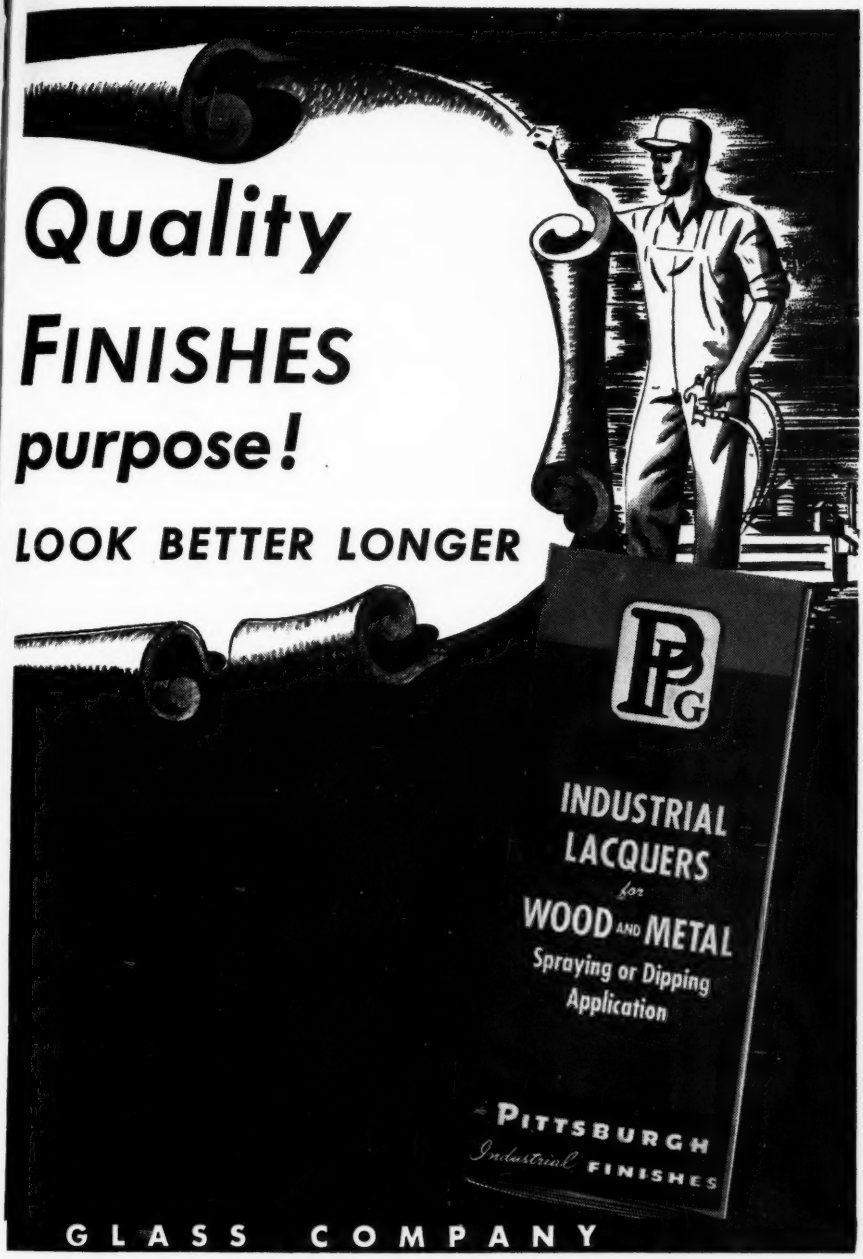
"General Purpose Fans" is the title of an eight-page bulletin designated as Bulletin 481 distributed by the New York Blower Co., 32nd St. & Shields Ave., Chicago 16, Ill. The bulletin describes the various portable self-contained units for low pressure industrial and ventilating applications manufactured by the company. Copy free upon request.

Udylite Folder. A two-page folder describing the use and advantages of Udylite "Chrome-Lock Tubes" in reducing chromic acid loss from chrome plating solutions has been issued by The Udylite Corp., 1651 E. Grand Blvd., Detroit 11, Mich. Copy free upon request.

Seymour Non-Ferrous Alloy Catalogs. The Seymour Manufacturing Co., Seymour, Conn., has issued catalogs describing Seymour Nickel Silver Alloys and Seymour Phosphor Bronze Alloys. Specifications, properties, characteristics, and applications of the various alloys are listed. Copy free upon request.

Westinghouse Booklet. Radiant heat processing for metal-working and other industries is described in a 16-page booklet "Modern Baking, Drying, Heating with Industrial Infrared Lamps" announced by Advertising and Sales, Westinghouse Lamp Division, Bloomfield, N. J. Case histories are given to show how infra-red cuts costs, speeds production, and saves space where heat is required for dehydrating, finish baking, or mass heating. The four major types of installations—the portable or non-oven type, the single-walled oven, the double-walled oven, and the insulated oven—are discussed in the booklet. Application data to aid in planning installations is included. Copy of Booklet A-3817 free upon request.

ALUMINUM shingles finished with baked enamel in color are being packaged as they leave the dryer in the plant of the Southern States Iron Roofing Co., Birmingham, Ala. The paint is applied after the aluminum shingles have been processed through a Duridine spray bath which forms a paint base to ensure maximum adhesion of the baked enamel finish.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How Tank Capacity Affects Galvanizing Cost

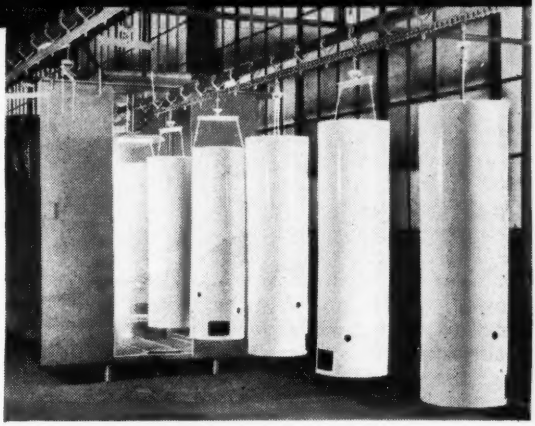
By WALLACE G. IMHOFF
President, The Wallace G. Imhoff Company
Los Angeles, California

HOT dip galvanizing has become a science. In the past twenty-five years it has advanced from a mystic bottle, bag, and jug on the shelf manipulation by a not-too-well-informed practical operator to a well-organized, orderly, controllable science. There are still a few components that are a most important factor in keeping down galvanizing costs that perhaps have gone unnoticed because the scientific facts involved are not spectacular and are of a nature that do not attract attention for specific study. The question of tank capacity all along the production line in hot dip galvanizing equipment is one that has received almost no attention in the technical literature.

About twenty years ago, two galvanizing plant managers were deeply involved in a discussion of the life of their pickling tanks. The one stated he was constantly repairing his tanks, and that their life was only 6 months to a year. The other appeared deeply puzzled and remarked, "Why our tanks have been in use for about 11 years, and we have had almost no upkeep or repairs whatsoever." The conversation continued; each had six hot dip galvanizing furnaces for galvanizing metalware articles; they were in the same field of galvanizing; each did a production of 18 dozen standard light gauge, 12-quart water pails. However, one point vividly stood out; namely, in the one plant acid fumes were very bad, working conditions were generally extremely disagreeable, and tank life was short with constant upkeep and repair. Things were very different in the other plant; the tanks had been in service almost 11 years with little or no upkeep and repair, there were no fumes of any consequence, and working conditions appeared to be good for that type of work. The two managers parted and they never did figure out what was the cause of the difference in results obtained from the same articles, the same production, and the same number of operating galvanizing kettles.

Some time later the author had the opportunity to visit and study each of the above plants. The discussion was never forgotten, so that this incident was the cause of forcibly illustrating the very important factor of capacity and number and size of units in the production line. Pickle tanks were not the only equipment that came up for discussion from time to time. One of these same managers had very forcibly expressed his opinion that the surest way to keep down dross production was to use the smallest possible galvanizing pot. His explanation was that the larger the volume of zinc under heat, the larger the volume of dross production. There were still many V-shaped pots in the industry at this time.

White and *Ivory*
PAINT BAKING PROBLEM SOLVED
by NEW JENSEN Infra-Red Method



HOW TO BAKE white and ivory paint on outer jackets for automatic water heaters . . . **without danger of discoloration . . .** was solved at Ever-Hot Heater Company, Detroit, by Jensen's surprising new **"staggered lamp"** infra-red oven. By **"nesting"** the lamps, with alternate rows 8 lamps high, then 7 lamps high, the danger of overbaking certain areas and underbaking others was eliminated. Over-all, even distribution of heat was assured and **evenness** of color guaranteed.

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DESIGNERS and BUILDERS of "DUAL HEAT" INFRA-RED OVENS • CONVEYORS • PAINT DIP TANKS

Fig. 1 — Early V-shaped type of galvanizing pot (*Photo courtesy Columbiana Boiler Co., Columbiana, Ohio*)

Tank Capacity

The far reaching influence of tank capacity was never dreamed of as a vital factor affecting galvanizing costs. If inquiry was made as to why the galvanizing pot was of a certain size and capacity, and why the pickle tanks were the size they were, the answer would probably be, "Well, when we started up in the galvanizing business we got all our dope from the so-and-so company which has been in business for years." And in those days, if you asked the manager of the so-and-so plant that had been in business for years for his answer he would probably say, "Our superintendent was the galvanizer in the plant over on 3rd Street, and he brought all the details of pot sizes, tank capacities, and so on, when he came to us." And there you have the basic reasons for the pot sizes and tank capacities in those early galvanizing plants.

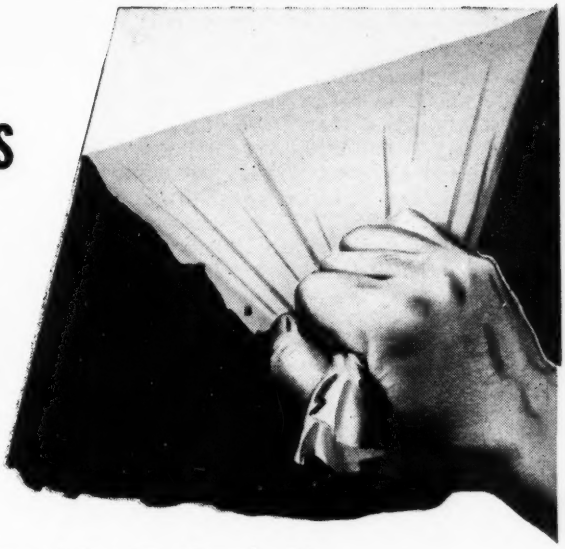
Premature Failures and Galvanizing Troubles Start Research

Engineering in all industries began to show advancements and better techniques as a result of research programs. The various components of engineering began to merge with the discovery by the combustion engineer that he could do a much better job, build a much better furnace, and get much better results if he knew something about the science of hot dip galvanizing. The galvanizer started to inquire into the quality of his steel base, and the steelmaker decided it was profitable to learn something about galvanizing. They found that troubles began to disappear rapidly when they all got their heads together to determine what was the real cause of high costs and poor galvanizing results. Premature failures were extremely costly, and defective work at times meant very heavy losses.

Improved Equipment Eliminates Much Trouble

It was not many years until the old riveted V-shaped pot, illustrated in Fig. 1, disappeared entirely in favor of the riveted rectangular pot as shown in Fig. 2. Then, the electric welded sheet pot, illustrated in Fig. 3, replaced the riveted types. Acid-proof brick pickle tanks, steel-shelled acid-proof brick tanks, rubber-lined tanks, and today even plastic tanks are used for pickling. Guessing temperatures is a thing of the past, and so we might go on listing the progress that has been made in improving the equipment for hot dip galvanizing. The science of galvanizing reversed many old ideas. It was found that dross production is a function of temperature and production and kind of base metal, instead of small or large quantities of metal in the pot. It was found that instead of a lighter weight of zinc being deposited with increased galvanizing bath temperature, a heavier deposit of zinc is obtained when all other conditions are standardized.

Clean your spray booths this easy, time-saving way!



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Little Known About the Influence of Tank Capacity

The purpose of this preliminary discussion about the art of galvanizing is to lead up to the fact that very little is known about the influence of the tank capacities all along the production line in galvanizing. A discussion of this phase of galvanizing will show that tank capacity is a vital factor of galvanizing costs and has a direct bearing upon galvanizing pot life, dross production, zinc per ton of product. In pickling it has a direct bearing on tank life, upkeep and repair of tanks, fumes, and working conditions; in rinse tanks it has a vital influence on cleanliness, which is an extremely important factor of good coating and alloying conditions; and in fluxing, the tank capacity is a vital factor of surface protection from oxidation and corrosion after pickling, dross production, and proper fluxing conditions. A more detailed discussion of each of these capacities will reveal how these factors all directly affect galvanizing costs.

Galvanizing Tank (Pot) Capacity

The importance of the correct hot dip galvanizing pot (tank) capacity is to be found in two basic scientific facts. The first is the fact that when the heat transfer through the heating of the sides goes over 10,000 B.T.U.'s per square foot of heating area, there is every evidence that the bath temperature on the inside of the pot is over 900 deg. F., which is the critical temperature at which rapid destruction of the pot begins. The second scientific fact is that from 15 to 20 pounds of metal should be allowed for every pound of production passing through the bath to keep from overheating, which destroys the coating qualities of the zinc. All hot dip gavanizing tanks (pots) that meet these scientific specifications should have a long pot life, low dross production, and good operating conditions. The difficulty lies in knowing how to determine the correct pot capacity to obtain these advantageous results.

Without going into too much detail, a brief illustration will be given to show how the proper galvanizing pot capacity is determined. The starting point is the production in pounds per hour desired. If we want 1,000 pounds per hour, then on the basis of 20 pounds of zinc to 1 pound of production the tank capacity should be 20,000 pounds of metal. The more important fact is to have a pot size that will afford that metal capacity, and still not have a heat transfer through the sides over the heating area of over 10,000 B.T.U. per square foot. In finding the exact pot size, usually a number of different sizes are tried, but here to save space we will use the correct size at the outset, and then check back. If the pot is 6 feet long by 2½ feet wide by 3⅓ feet (40 inches) deep it provides a cubic foot capacity of 50 cubic feet. Molten zinc weighs ap-

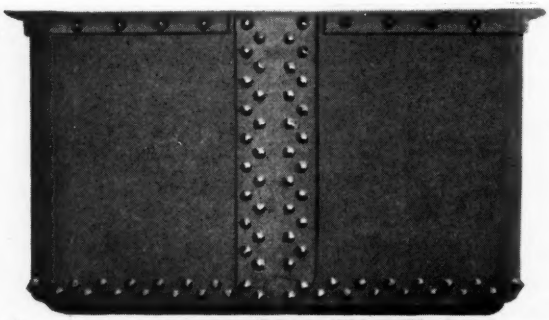

Fig. 2 — Riveted type sheet galvanizing pot *(Photo courtesy National Annealing Box Co., Washington, Pa.)*

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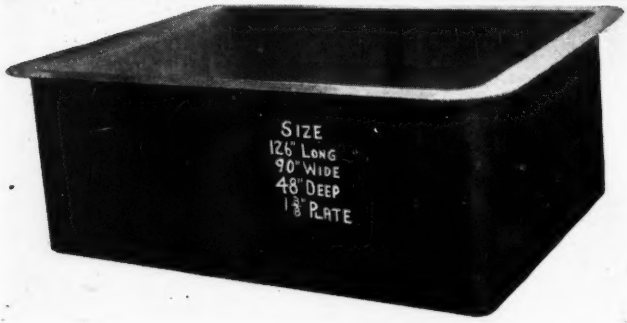

Fig. 3—Electric welded type sheet galvanizing pot (*Photo courtesy National Annealing Box Co., Washington, Pa.*)

proximately 420 pounds per cubic foot which gives a metal capacity of 21,000 pounds of metal. The bath is never even with the top of the pot so that the actual operating capacity can be assumed to be 20,000 pounds of metal. This checks with the former figure of 20,000 based on 20 pounds of metal for each pound of production. Thus, the pot size provides the proper metal capacity so that the molten zinc is not overheated.

The next thing is to check the pot size (which is correct for metal capacity) for heat transfer for long pot life. The sides are 6 feet long by 40 inches (3⅓ feet) deep. This provides a square foot area of 20 square feet per side, or 40 for both sides, and since approximately only 70 per cent can actually be heated, the heating area then will be 28 square feet. If the maximum heat transfer per square foot is 10,000 B.T.U., then 28 times 10,000 or a total of 280,000 B.T.U. per hour is the heat input into the pot through the two sides. It is not far wrong to assume 280 B.T.U. are required to galvanize each pound of production (some authorities go as low as 250 B.T.U. per pound). In that case, the total heat of 280,000 B.T.U. divided by 280 B.T.U. per pound equals a production per hour of 1,000 pounds. Thus, our figures check every way and we find that for a production of 1,000 pounds per hour 20,000 pounds metal capacity in a galvanizing pot that is 6 feet long by 2½ feet wide by 3⅓ feet deep is the scientific pot specification to afford the longest pot life, the lowest dross production, and the best operating conditions, assuming that the heat is uniformly and correctly applied to the sides of the pot, and that the pot sides are the proper thickness.

A check like this on most galvanizing pots shows that they are out of balance either in metal capacity for the production put through in pounds per hour, or that the pot is heavily overloaded from the standpoint of heat transfer put through the sides. Only recently a pot was found to have almost twice the production that it should have going through it from the standpoint of actual heating area of the sides. A check showed over 15,000 heat units passing through every square foot of heating area and the metal capacity far too small for the production actually being done. The checkup was made because of heavy dross production and short pot life.

Pickle Tank Capacity

Space will not permit illustrating how the proper tank capacities are determined for pickle tanks, rinse tanks, and flux tanks. It is believed the most important fact to be illustrated is the action that takes place when the capacities are too small. Consequently, for this illustration, the example cited at the beginning of the article may be discussed in detail. In the manager's

2 Minutes
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by immersion

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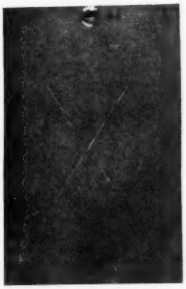

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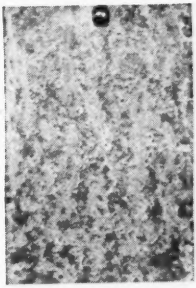

Alkali-cleaned aluminum. After only 300 hours' salt spray exposure, the metal is badly corroded over its entire surface area.

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plant that had good working conditions, almost no pickle fumes or steam vapor, and long pickle tank life with very low upkeep and repair, a checkup showed 11 tanks that were 16 feet long, 4 feet wide, and 2½ feet deep. Pickling was done at a temperature near 120 deg. F., and the acid strength seldom was above 2 to 3 per cent. A checkup on the other manager's plant showed he had only two pickle tanks that were 12 feet long by 4 feet wide and 4 feet deep. His operating temperatures were right up to the boiling point, and the steam vapor, acid fumes, and heat pouring from the tanks created almost unbearable working conditions. In addition to having an extremely high labor turnover, the pickle tank life was short, and upkeep and repair were excessive.

This illustration shows very conclusively that when the pickling capacity is too small, the direct results of the incorrect situation are reflected in heavy acid fumes, steam vapor, short tank life, heavy upkeep and repairs, and abominable working conditions which mean a very high labor turnover. It is a very obvious fact then that a plant that has these conditions must have too small pickle tanks and too small pickling capacity. The remedy is therefore larger pickling tanks, more pickling units, lower pickling bath temperatures, and lower acid strengths.

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Rinse Tank Capacity

Even less than twenty five years ago few plants had sufficient rinse tank capacity, and in some fields such as metalware galvanizing, no rinse tanks at all were used. Most pipe and sheet galvanizing plants each had one rinse tank; the use of two rinse tanks was regarded as a luxury. Today most galvanizing plants have at least one rinse tank, some two, and others even three. The purpose in the case of three tanks is twofold; namely, to provide an additional pickle tank if necessary.

The great importance of thorough rinsing is a somewhat recent discovery. This factor gained fast recognition when it was shown conclusively that heavy dross production resulted from the iron salts carried over into the galvanizing bath when no rinse was used. It was shown also that iron salts tended to weaken the bond of the coating and provide a poor finish. Another factor was the development of corrosion on the surface which tended to reduce the adherence of the zinc to the base metal. It acted as an insulator. Corrosion also was the direct cause of peeling and flaking of the coating. Gradually, the operating technique changed to the use of more rinse water and keeping the clean pickled surface under the water as much as possible and exposing it in the air only the time absolutely necessary for processing and passing from one operation to the next. Water rinse capacity was

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also used for storage purposes. The important factor in having enough water rinse capacity is based on the fact that the surface must be kept as clean as possible after pickling, and all pickle salts must be thoroughly rinsed off the surface after pickling.

Flux Tank Capacity

There is still one other relation of tank capacity that has not been mentioned, and which was discovered through too small a flux tank capacity. This important operating factor is loss of temperature in the bath due to too small liquid capacity in relation to production unit heat absorption. This point was very vividly brought out in a galvanizing plant having a liquid flux tank that was only 3 feet square by 30 inches deep.

In ordinary routine plant operation there does not appear to be any direct relation between the dross production and the tank capacity of the liquid flux solution. In at least one instance it was discovered that the main cause of very high dross production was the fact that the liquid flux tank capacity was too small. For example, when a crate carrying 600 pounds of fittings was lowered into the tank, the heat absorption by the cold iron reduced the liquid flux bath temperature to a point so low that heavy corrosion and iron oxide covered the surface of the work as it dried. As a result, very large amounts of iron were carried into the bath, creating the excessive dross.

For proper operation in the average plant the flux should be maintained at a temperature of from 180 to 200 deg. F. The saturation should also be strong enough to create a "salt glaze covering" similar to cellophane over the clean iron surface. This very small capacity flux tank held less than 150 gallons of flux solution since the tank could only be filled two thirds full to avoid running over when the baskets were lowered into the tank. The solution capacity was not large enough to provide a reserve heat for 600 pounds of cold iron which was being fluxed. The temperature would drop from 185 deg. F. down to as low as 120 to 130 deg. F. in the winter time. Then, when the fittings were emptied on the dry pan, instead of drying almost instantly without any corrosion whatsoever, the temperature was so low that the surface stayed wet and, as it slowly dried, the air attacked the surface, covering it with a heavy green corrosion product of iron. This corrosion product not only slowed down production because the work required a longer submersion time in the zinc bath to dissolve the corrosion, but in some cases fittings rejected due to flux spots, oxide, and bare metal spots mounted rapidly.

Too Small Dryer Capacity

If a dryer is used, either the old steel hot plate dryer or the new modern hot

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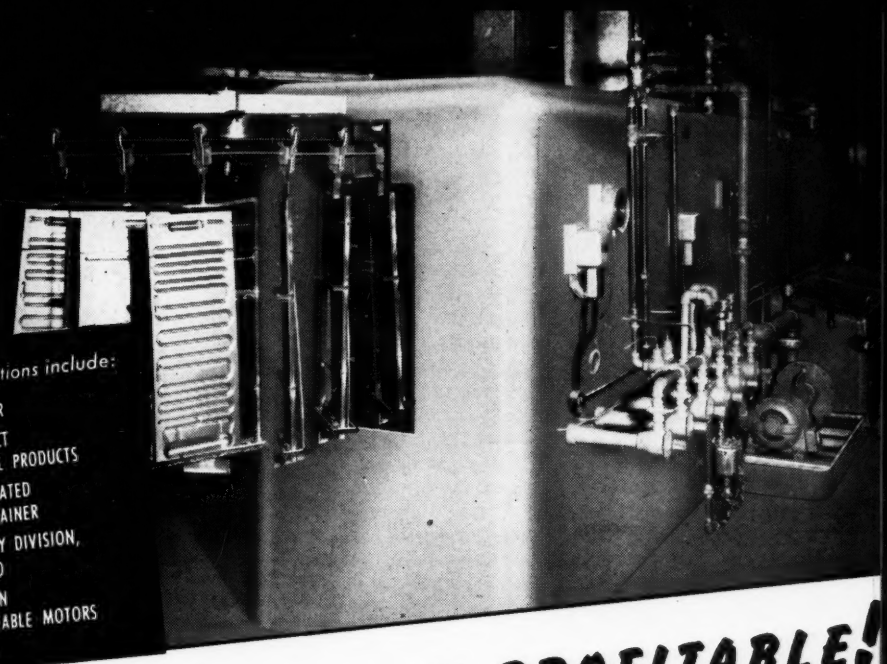

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air dryer, and the capacity of the dryer is too small, then trouble again develops. When the steel hot plate dryer is too small, the dryer must be kept hotter to pass on the production more quickly. Too hot a dryer "burns" and rusts the material at the bottom of the pile against the dry plate, while that at the top steams and gradually forms a green iron corrosion product over the surface. If the hot air dryer is too small, then the work may have to pass through it so fast that it does not have a chance to become completely dry, and again corrosion will develop. In both cases, the iron corrosion product will produce excessive dross, and tend to slow down production. The longer submersion time required increases the metal consumption per ton of product. Thus in every operation in the processing technique of hot dip galvanizing it can be seen that tank capacity plays a very important part in determining galvanizing costs.

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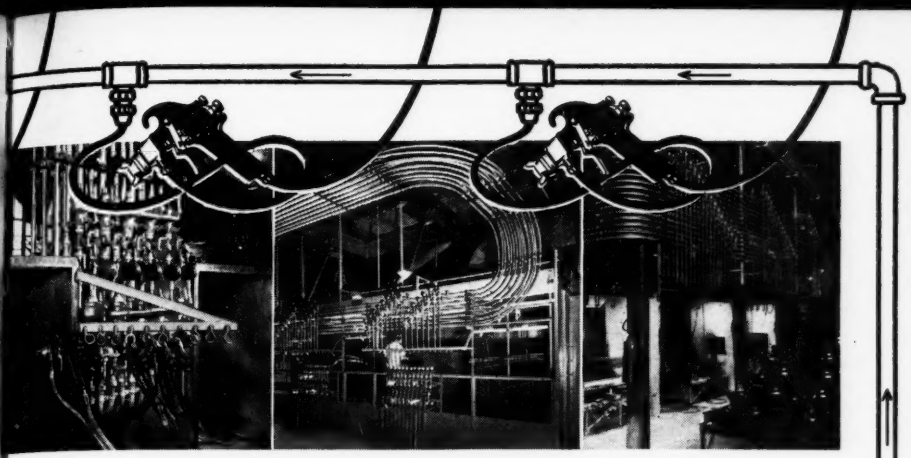
Summary of Cost Increasing Factors with Too Small Tank Capacity

1. Galvanizing Pot (Tank) Capacity Too Small.
   (a) Increases dross production.
   (b) Shortens pot life.
   (c) Tends to overheat metal.
   (d) Increases zinc per ton of product.
2. Pickle Tank Capacity Too Small.
   (a) Cause of vicious, choking pickle fumes.
   (b) Cause of high acid strength.
   (c) Cause of operating at high temperatures.
   (d) Cause of wide variation in bath temperature.
   (e) Cause of irregular, unsatisfactory pickling.
   (f) Cause of very poor labor conditions.
3. Too Small Rinse or No Rinse:
   (a) Excessive dross production.
   (b) Corrosion after pickling.
   (c) Iron in zinc coating.
   (d) Contamination of flux on pot.
   (e) Increased cost because of lack of cleanliness.
4. Too Small Liquid Flux Tank Capacity:
   (a) Loss of temperature of solution.
   (b) Decrease in fluxing efficiency.
   (c) Slow drying forming corrosion.
   (d) Heavy dross production from corrosion.
   (e) Increase in metal consumption per ton of product.
   (f) Low quality finish, increased number of seconds, rejects, poor operating conditions.
5. Too Small Drying Capacity:
   (a) Development of corrosion.
   (b) Increased dross.
   (c) Poor surface for coating.
   (d) Increased costs because of improper drying.



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Paint Circulating Systems

Barrel Finishing of Metal Products

Part 21—The Application of Ceramic Barrels to the Finishing of Metal Products

By H. LEROY BEAVER
Barrel Finishing Consultant
Lansdale, Pennsylvania

IN the discussion of the various factors of barrels, barrel finishing materials, and methods we seem of late to have digressed in a variety of directions in the choice of subjects, but as long ago as last September we started to investigate the possibilities in the use of a ceramic barrel, jar, or crock.

In conducting research experiments with a wide variety of materials one of the greater difficulties has been the matter of the impregnation of either wood or wood-lined metal barrels with the particular solution or material used in any one experiment. If not that, then when we use a metal barrel we have to continually keep in mind the reaction we might secure from the particular metal from which the barrel is made, the parts to be processed and the solution used in the processing, whether acid or alkaline in character. And as if this were not enough we have the added problem of determining the proper size of barrel and its method of operation as relates to the finishing of a given line of metal products.

A wood-lined or all-wood barrel cannot be used for succeeding barreling operations using different materials due to this matter of impregnation. A metal barrel has somewhat similar objections due to the reactions obtained. Thus we came to the conclusion that what we required for many of our research operations, and that manufacturers as well required, was a barrel, jug or crock produced from an inert material in which either acid or alkaline solutions could be used. Such a ceramic unit could be washed, scrubbed or rinsed after each experiment or production operation, thus leaving it clean and uncontaminated.

Realizing as we do the importance of such a unit for use in our own work, we determined to check the reaction of others to the idea and so in turn we explained the thought to five separate laboratory technicians whom we knew conducted research experiments. If their answers could be reduced to a composite answer it would simply be, "Where and how soon can we get such a setup?"

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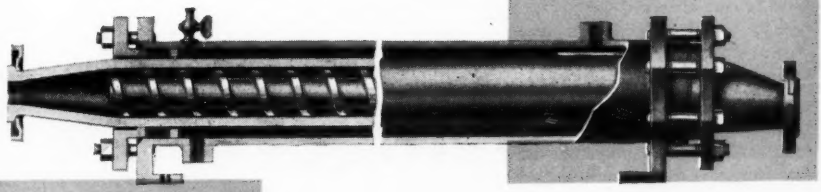

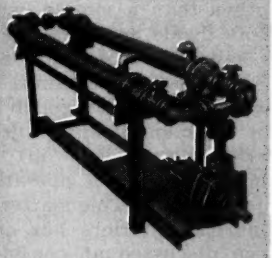

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Pressure Drop	5 to 34 feet	5 to 43 feet
BTU per Hr. as Heater, 75 lbs. Steam, Liquid inlet Temp. about 100° F.	135000 to 155000	240000 to 430000
BTU per Hr. as Cooler, 100° F. Mean Temp. Diff.	45000 to 90000	100000 to 210000

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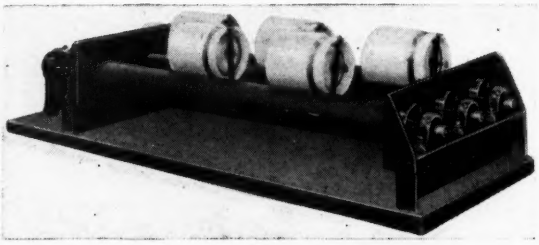

Illustrated herewith is a multiple-jar mill employing round vitreous jars with clamp-type lids.
(Photo courtesy Abbe Engineering Co., New York)

●

you have regularly followed this series of discussions and if you have retained your files of PRODUCTS FINISHING, and will turn to page 80 of the January 1948 issue, you will there find a simple outline drawing of a roller friction drive, the original of which is attributed to the English Spencerian Pen Company. There is nothing new about roller drives, for upwards of thirty years ago there was in operation in the factory of the Atlas Ball Company a "gang" drive which was in reality a friction roller drive much like that which we have already described. It was capable of operating six heavy oaken casks in which balls prior to heat treating were operated with abrasives to remove grinding marks and to reduce surface area. Steel balls, being the acme of symmetry, can be operated at far greater barrel speeds than more intricately formed parts; therefore these casks were spun around at approximately 50 r.p.m., a speed that would be fatal to the finishing of many metal products.

We have known for many years of roller operated ceramic jars which are used in the drug and chemical industries for the pulverizing of a wide variety of materials. In order to find what had been done by any of the suppliers of such devices, we gathered together all of the available literature we could find. However, nowhere could we find the slightest mention of the use of these devices for the barrel finishing of metal products or of their use in the research determination of materials or methods applicable to metal product finishing. One manufacturer lists as many as 166 different materials that may or have been operated in such mills, specifying especially that they are used for "grinding, pulverizing, dispersing, mixing, compounding, analysis, experiments, and production," but in all of the list of materials there is no mention of their application in barrel finishing procedure on the various metals.

Another manufacturer contents himself with saying, "Jar mills are used to pulverize and mix pigments, drugs, chemicals, minerals, clays, dyestuffs, colors, and so on, either dry or in liquid." Nowhere does any literature that has come to us disclose any effort to create other than a simple cylindrical jar both inside and outside and in no case have we found that any conception has been entertained of either a hexagonal or octagonal interior or the insertion of any projecting lateral ribs to provide a "lift" to the mass in the course of operation within the jar or crock. This matter of simple cylindrical interiors has only recently been discussed at considerable length as you will note if you refer to your December 1947 issue of PRODUCTS FINISHING and more especially to the line diagram as shown on page 30.

Now let us examine into the possibilities and the importance of this research just a bit further. It will not be too difficult for you to picture in your mind's eye a casual base, let us say 12 inches wide x 24 inches long. On this base we mount a small motor,

Carries Away Overspray . . . IN A WHIRLING TORNADO OF WATER

PAINT-LADEN AIR IS "TORNADO" CLEANED. Operators, working in a Schmieg Centri-Merge Spray Booth, are adequately protected from fire and fumes. Overspray is carried on an air stream *horizontally* away from work into a curtain of water, pressure-fed through slots extending continuously full width of booth, that descends down the flood sheet. The mixture of fume and paint-laden air and water is then whirled under the flood sheet and hurled with tremendous impact against the impingement wall at back of booth. Down this impingement wall flows an additional sheet of water that floods the foreign matter, pounded out in the process, into the sludge tank below. Only CLEAN AIR passes through exhaust fan. Thus the danger of fire is suppressed both in front and behind the flood sheet. Because the ratio of water and air is far greater in Centri-Merge, paint and other gummy substances do not pile up on the hard-to-get-at walls of the chamber behind the flood sheet; therefore, cost of repeated cleanings is eliminated.

Consult Schmieg engineers regarding your problems of dust and fume control.

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either with reduction gear built in or attached to a small geared speed reducing unit. Then on four simple bushings we mount two rubber-covered rollers not unlike the rollers on a clothes washing machine. The drive is attached to the end of one of these rollers; the second roller simply idles. These rollers are simply spaced wide enough apart to hold either a six or eight-inch diameter jar or crock. Let us say that a jar has been loaded with parts to be barrel finished, finishing material, water charge, and soap. This jar is placed upon the rollers and the machine is started. While the jar is operating, a second jar is loaded precisely in the same manner as the first. When the first jar has completed its normal operation cycle, it is simply lifted off the rolls. The reserve jar which is immediately at hand is placed on the rolls and set in operation. All of this can be accomplished with the loss of less than one minute in production time. The first jar is then taken to the rinsing sink, the contents dumped into a separating screen, the jar rinsed free and clear and reloaded with a new charge of parts, finishing materials, soap, and water. Using this method and by purchasing one roller drive unit plus two jars it is possible to have not only the equivalent of two separate burnishing machines, but the easiest and simplest method for securing as near to 100 per cent of actual profitable production time as would be humanly possible.

In January and February of 1948 we paid our respects to the so-called tubbing machine which was originally the invention of Everett Barton. We select this particular form for comparison for the reason that it is the most prevalent in the industry; for example, costume jewelry and like small parts manufacturing, where small sizes of barrels are the rule. We wish very much that any manufacturer operating this type of barrel would just quiet-

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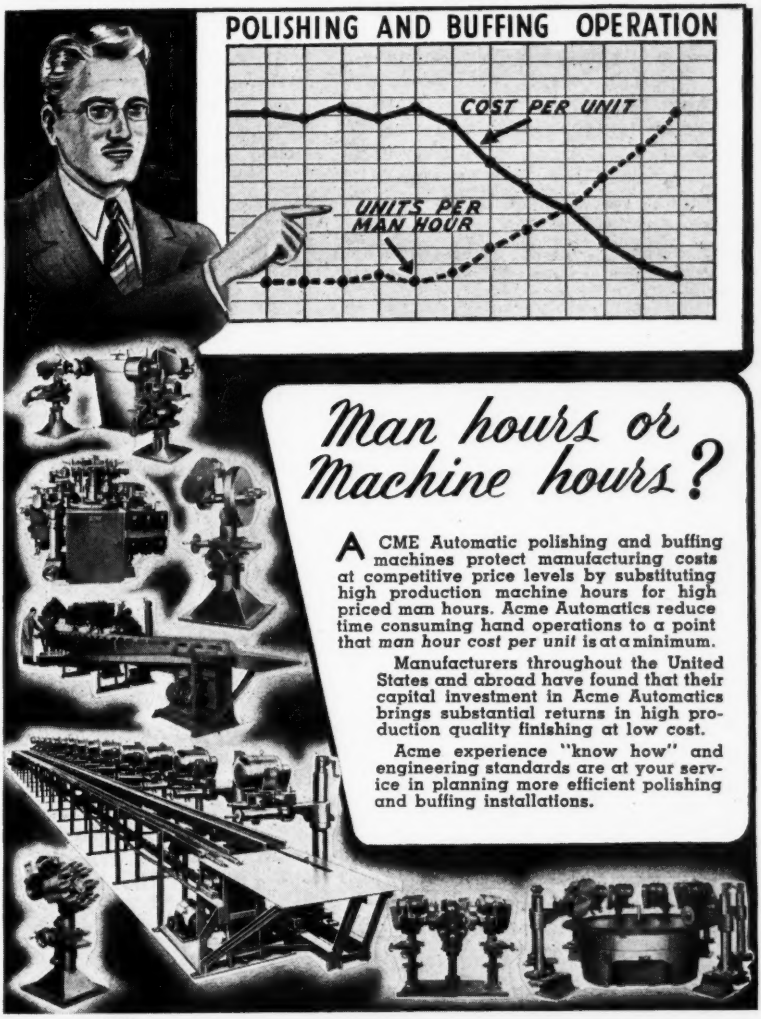

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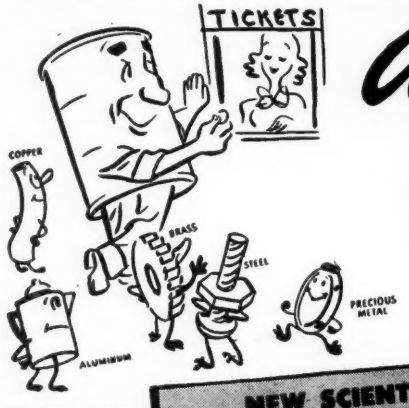
ly and quite unobtrusively take his position in some out of the way spot and record by his watch the time required to remove one load of parts from this type of machine and add another load. Since last September we have made this test several times and find that the loss of time varies from sixteen to twenty-two minutes, or let us say an average of twenty minutes. Now if ten loads per day are operated with a loss of twenty minutes between loads that would simply mean 200 minutes, or 3⅓ hours, of lost production time. When we add to this the loss of production itself, the possibilities of this proposed ceramic mill setup become more apparent.

We can quite clearly see from the background of many years of barrel finishing experimental work with every kind and size of barrel the enormous possibilities that lie in the adoption of this type of drive and barrel. This is particularly true in the case of small and intricate parts, or parts made from very thin materials, that would suffer appreciable permanent distortion if operated in any barrel currently available.

Right now we have before us for examination three sets of samples of production from three widely separated manufacturers, one of them a division of one of the largest manufacturing corporations in this country. All three are what we would term screw machine type parts, but produced on small bench-type precision lathes. The problem in all three cases is: how to create a radius on the shoulders of the projections on the parts, and how to secure a mirror finish reasonably equivalent to the finish secured on hardened steel bearing balls. What make and style of barrel would we recommend for the work, what abrasives or polishing media and what operating technique? Our answer in all three cases must be very simply that to the



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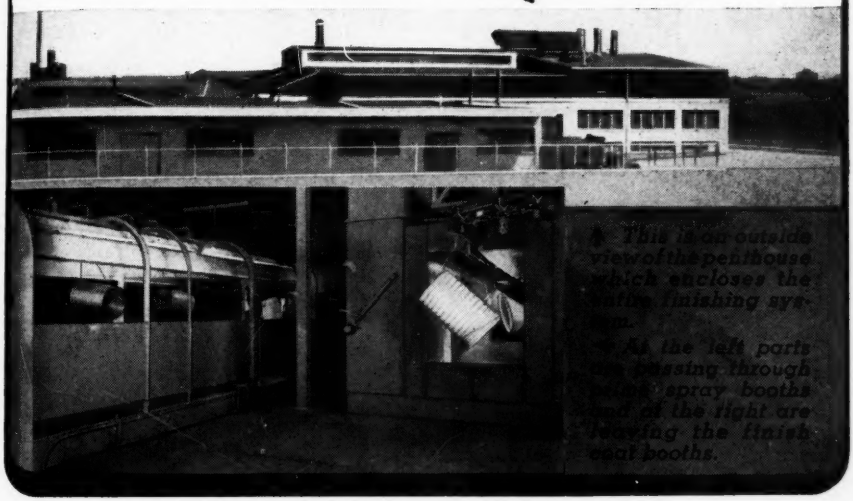

A. This is an outside view of the penthouse which encloses the entire finishing system.

B. At the left parts are passing through the spray booths and at the right are leaving the finish coat booths.

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To save valuable plant area at Motor Products Corporation's Deepfreeze Division where the famous Deepfreeze Home Freezers are made, Newcomb-Detroit installed the entire finishing system on the roof of the plant. The system includes a spray bonderite system, dry off oven, prime and finish coat booths, prime and finish coat ovens, and an air supply system to distribute conditioned air to the booths and ovens. The entire system is connected by conveyors to the production departments below.

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best of our knowlege there is no barrel presently available in industry for the handling of parts of this character. We do know the technique and the materials that would be required, and we know further that the often-spoken-of process of attempting to use a glass fruit jar or bottle with its simple cylindrical inside surface is without merit.

Inasmuch as no crocks are available on the open market with either hexagonal or octagonal interiors or with either six or eight lateral ribs projecting from the inner surfaces of the crocks, what we desire to do is to have contact with as many manufacturers of crocks as possible who have facilities to produce these units. Two sizes are recommended, the smaller to be six inches in diameter and twelve inches long and the second to be eight inches in diameter and twelve inches long and to have either six or eight-sided interiors or to have six or eight projecting half-round ribs, five eighths of an inch high and spaced equidistant around the inner periphery of the crock. The crocks should be made of a material that will fire to a close fine grain and they may be glazed or unglazed. The final color of the crocks is not important. Each crock should be fitted with a lid of the same material with the very simplest form of lid closure.

Inasmuch as we are unable to find existing any jar or crock coming within the description we have already given, we assume that we have the right to consider that the development of either a six or eight-sided crock interior or the inserting of half-round baffle strips, constitutes a new, novel and original development in the field of barrel finishing procedure for the surface treatment of metals that would entitle the improvement to have patent consideration. If this be true then we wish it to be understood that your author considers the improvement as described herein to constitute a dedication to public use. The proposed burnishing barrel as herein described must be a completely competitive article just as the products it will be used to finish must take their place in a completely competitive market.

We have been obliged to say "no" so very many times to manufacturers who have asked us for information respecting the finishing of sample parts they have submitted, and looking back over some of these we can see where many of these "no" decisions can be received and transformed into "yes," with the perfecting and adoption of the simple appliances covered by this discussion.

To those expressing interest we will be glad to supply sketches of what is required and additional data to enable them to figure on production of either crocks or drives. If those users of barrel finishing procedure to whom this development would be of interest and

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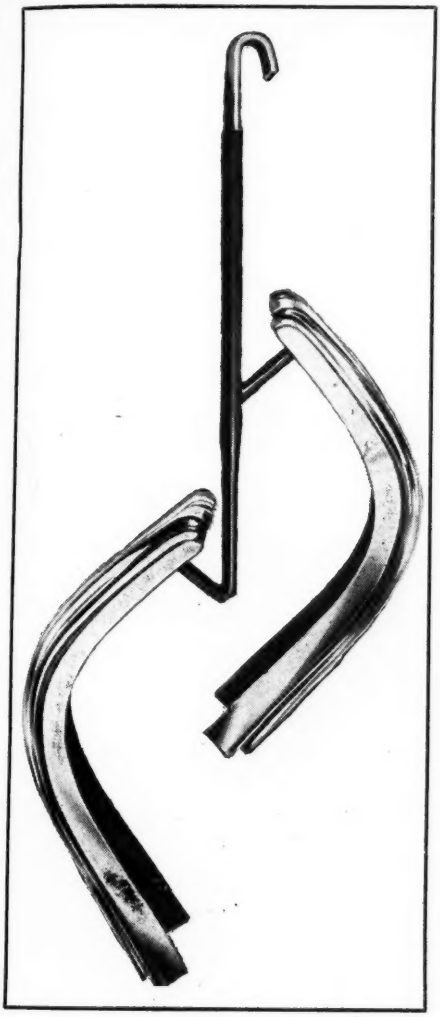

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value in the finishing of small parts will write to us expressing their interest, we will see to it that information concerning further developments and sources of supply is forthcoming.

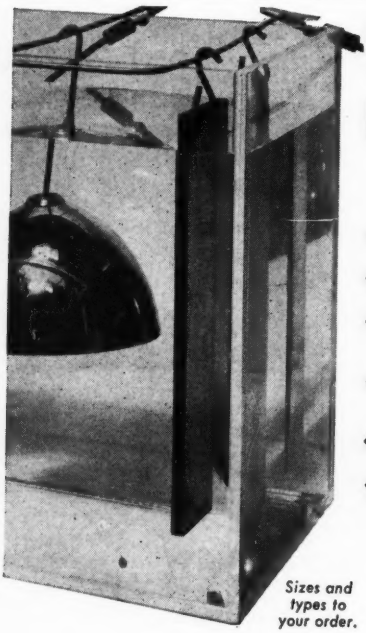
Polishing Wheels. An illustrated two-page bulletin covering sheepskin discs and wheels has been issued by Divine Brothers Co., 200 Seward Ave., Utica 1, N. Y. The bulletin provides valuable specification data, recommends uses, and lists the various discs and wheels available for polishers' use.

Titeflex Monel Flexible Tubing is illustrated and described in a six-page pocket-size folder published by Titeflex, Inc., 422 Frelinghuysen Ave., Newark 5, N. J. Included are complete descriptions of the physical properties and corrosion-resisting characteristics of the tubing. Copy free upon request.

"Minit-Kote," a cleaning emulsion for preparing metal surfaces for painting, is fully described in a four-page two-color illustrated folder prepared by Klem Chemicals, Inc., 14401 Lanson Ave., Dearborn, Mich. Copy free upon request.

Phibro Industrial Chemicals. Philipp Brothers Chemicals, Inc., 37 Wall St., New York 5, N. Y., now has available a 28-page pocket-size booklet presenting convenient data on its complete line of industrial chemicals. Copy free.

Sarco Steam and Water Mixer Bulletin. A two-page illustrated bulletin designated as Bulletin No. 900 describes the Type SWV steam and water mixer furnished by the Sarco Co., Inc., Empire State Bldg., New York 1, N. Y. Illustrations show the construction features of the steam and water mixer and typical installations employing this device. Tables supply information on dimensions, capacities, and so on. Copy of Bulletin No. 900 free upon request.



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Finishing Clinic

Mechanism of Chromium Plating and Characteristics of Deposits

By DR. ALLEN G. GRA

CHROMIUM plating finds extensive use as a final finishing operation on many metal articles, where it is deposited as a thin film over a suitable undercoat, such as bright nickel, to produce a non-tarnishing durable surface finish for decorative purposes. Two papers were presented at the 92nd general meeting of The Electrochemical Society, held at Boston, dealing with the mechanism of chromium plating and the physical properties of the plate produced. Cloyd A. Snavely described the general studies conducted in the laboratories of Battelle Memorial Institute on the structural characteristics of chromium plate and the mechanism of chromium plating. In another paper, M. R. J. Wyllie, Rhodes Scholar and Fellow by Courtesy, Johns Hopkins University, presented the details of a semi-quantitative method for measuring the ductility of chromium electrodeposits.

Based on data presented by Snavely, solution composition and other plating factors can be adjusted so that chromium deposits either as a metal in the body-centered cubic (B.C.C.) crystal arrangement, as a hydride in the hexagonal arrangement, or as a hydride in the face-centered cubic arrangement. The hydrogen atoms are interstitially placed in the hybrides. The body-centered cubic plates are stable, but the hydrides are structurally unstable and decompose with shrinkage in volume to form body-centered cubic crystal arrangement metal and hydrogen. The hydrogen, it was reported, may escape or may be occluded in the plate. A

A Monthly Digest of Current Technical Progress Indicating Significant Trends and Developments in the Finishing Industry

THIS MONTH . . . Mechani of Chromium Plating Characteristics of Depo . . . Formation of Black Oxi Coatings on Ferrous Artic . . . Passivity of Corros Resistant Alloys . . . Spr Versus Brush Applicati Methods on Exterior St Surfaces.

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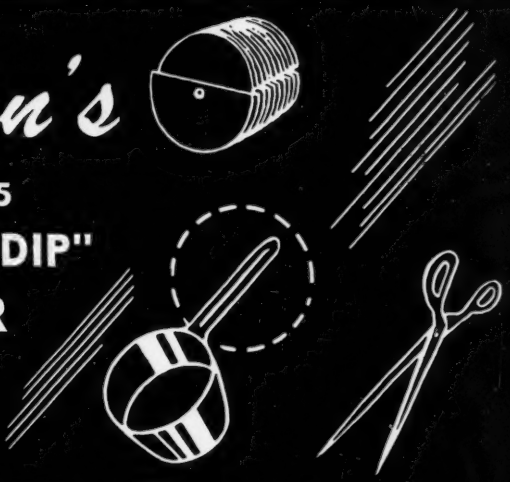

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TABLE I

Some of the Variations in Bath Composition and Operating Conditions Used in the Study of Chromium Plating

Bath No.	Total Cr as CrO_3	Total Cr as Cr	Cr_+^6	Cr_+^3	$\%Cr_+^3$	SO_4	Acid Ratio CrO_3:SO_4	Comments
1	359	...	...	...	...	3.6	100 / 1	Conventional chromium plating bath. definite increase in hardness of plate w increase in thickness of plate was not Bath temperature 50° C.
2	251	130	98	32	24.8	2.5*	100 / 1	Narrow bright range at approximately 0. amp./sq. in. for short plating cycles. Long plating times at this c.d. produced grayi hexagonal plate. T = 0° to 10° C.
3	289	151	108	43	25.9	2.34	123 / 1	Narrow bright current density range at ap proximately 0.1 amp./sq. in. No hexagona deposits obtained. T = 20° C ± 2°.
4	276	144	107	37	25.8	5.05	50 / 1	Narrow bright range between 0.2 and 0.2 amp./sq. in. No hexagonal deposits obtained. T = 20° C ± 2°.
5	256	134	92	42	31.2	4.02	64 / 1	Bright range from 0.15 to 0.25 amp./sq. in. No hexagonal deposits obtained. T = 20° C ± 2°.
6	256	133	111	22	16.5	4.81	53 / 1	No bright range found. Gray plates with scattered bright areas produced. No hexa gonal deposits. T = 20° C ± 2°.
7	570	296	272	24	8.1	5.90*	97 / 1	Clear white plates in current density range from 0.1 to 0.4 amp./sq. in. No hexagonal plates obtained. T = 0° to 20° C.
8	575	300	256	44	14.5	5.86*	98 / 1	Gray-white deposits obtained at high current densities of 1.5 to 7 amp./sq. in. Bright deposit obtained at 0.5 amp./sq. in. Gray plates peeled leaving bright, thin layer of plate on the basis metal. T = 5° to 10° C.
9	631	318	239	79	24.7	6.00*	105 / 1	Bright range between 0.1 and 0.6 amp./sq. in. for plating times 10 minutes. Long time plate at 0.2 amp./sq. in. gave gray-white plate. Higher current densities produced brown film on gray plate. T = 5° to 10° C.
10	587	305	281	24	7.9	3.00*	196 / 1	Very white plates at current densities from 0.3 to 0.6 amp./sq. in. All plates produced at temperatures below 12° C. were completely hexagonal. T = 0° to 34° C.

* Indicates approximate value. Some of the sulfate determinations were made by the centrifuging method widely used commercially.

Note: T given for each bath indicates temperature or temperature range investigated.

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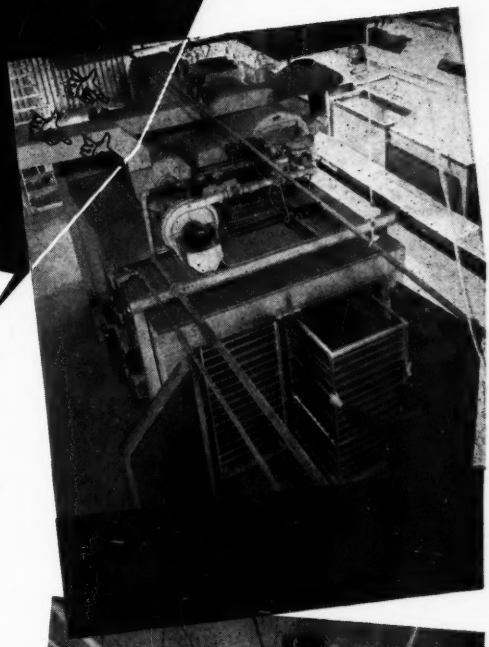

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number of variations in bath composition were studied by Snavely, and the data are summarized in Table I.

Mechanism of Chromium Plating. According to Snavely, the experimental data support a mechanism of chromium plating which is based on the principle that the reduction of chromium during electroplating is actually accomplished by hydrogen atoms rather than by direct electron transfer from cathode to chromium ion. Such a reduction mechanism thus requires a cathode film pH within certain limits and a sufficient supply of atomic hydrogen. The factors governing the cathode film pH and the atomic hydrogen supply operate at the same time to satisfy both of these conditions for plating.

Hydrogen atoms released at a cathode during electrolysis are very active and do not long remain as such in the bath. Several distinct paths of action are possible. When the cathode material is capable of receiving solute hydrogen, a portion of the atomic hydrogen generated at the cathode surface will enter the cathode by diffusion. This, however, is believed to involve but a very small portion of the hydrogen generated in chromium plating. A second possibility is that two hydrogen atoms will come in contact, near the cathode, and form a hydrogen molecule. Such molecules are relatively inert at ordinary temperatures and tend to join together to form gas bubbles which escape near the cathode at the bath surface. This process is known to occur for a major portion of the hydrogen generated in chromium plating. The third possibility given by Snavely is that hydrogen atoms will meet positive ions or complex forms which are reduced to a lower oxidation state, and the hydrogen atoms are "oxidized" to hydrogen ions. Such ions may then be in the same state as when first attracted to the cathode, may be combined with negative ions wrested from the reduced material (such as hydroxyl ions), or may become a part of complex particles formed by some of the partially reduced ions. A considerable portion of the atomic hydrogen produced in the chromium plating process is considered to follow such paths.

It was pointed out by Snavely that discharge at a cathode lowers the hydrogen ion concentration in the vicinity of the cathode. The hydroxyl ion concentration, therefore, increases to re-establish the equilibrium for the dissociation of water. While this process may be considered from several standpoints, it is generally agreed that the net effect is an increase in the pH of the diffusion film surrounding the cathode. Thus, the effect of hydrogen discharge at the cathode is, first, to produce a cathode film containing highly reducing atomic hydrogen and, second, to raise the cathode film pH

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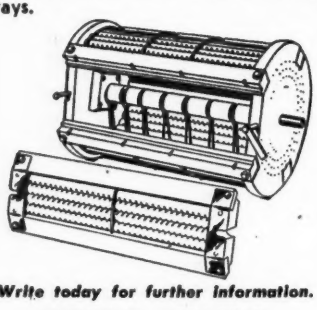

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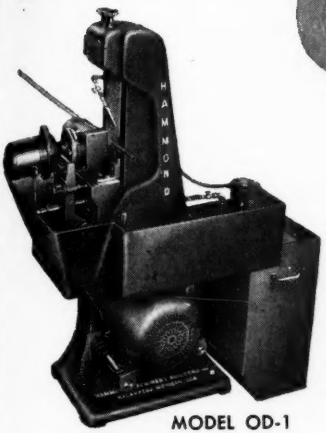

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above that of the solution proper.

Snavely explained that the concentration of both atomic hydrogen and hydroxyl ion in the cathode film may be increased by impeding diffusion within the cathode film and between the cathode film and the solution proper. An increase in chromic acid concentration increases the viscosity of the entire plating bath and, therefore, favors an increase in cathode film pH by lowering diffusion rates. A decrease in bath temperature has the same effect. An increase in the trivalent chromium content of the bath also increases the overall viscosity of the bath. An increase in current density increases the rate of removal of hydrogen ions. This, according to Snavely, explains the interdependency of temperature and current density in chromium plating. If the temperature of the bath is changed appreciably, a proportionate change in current density is necessary to maintain the cathode film pH within proper limits to secure a satisfactory plate.

Effect of Sulphate on Structure of Chromium Plate. In studying the effect of sulfate-acid ratio on the structure of chromium plate, it was brought out by Snavely that an acid ratio of 20:1 was selected as a proper extreme in the direction of high sulfate concentration. A 250 g./l. chromic acid bath was prepared with 12.5 g./l. sulfate. Plates produced from this bath at atmospheric temperature and below were found to separate into two layers. A thin layer always remained on the base metal. The overlying plate separated from this base as a disc which was always entirely body-centered cubic, bright to dull white, and extremely hard. Plates produced at temperatures above atmospheric showed less tendency to separate in this fashion. Thus, as emphasized by Snavely's work, it is shown that sulfate affects the type of deposits just as specifically as the current density,

R PRO

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Fig. 1—Cross-section of α bright chromium plate (etched surface x 200)
(Photo courtesy The Electrochemical Society)

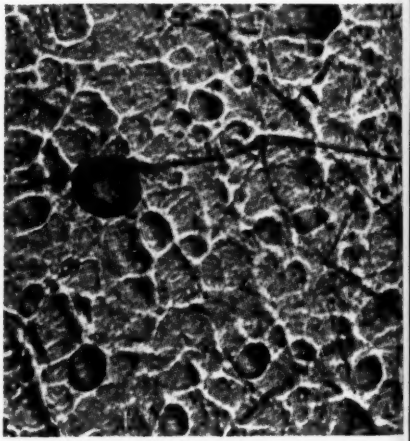
trivalent chromium concentration, and total chromic acid concentration. Baths low in sulfate concentration produced comparatively stable hydrides when electrolyzed under proper conditions. Baths high in sulfate concentration produced extremely unstable hydrides when electrolyzed under similar conditions. Cross-sectioned, polished, and etched samples of plate revealed that the inclusions were shorter and more numerous as the sulfate concentration was increased. Snavely pointed out that the length of the inclusions is taken as a direct indication of the amount and relative stability of the hydride deposited.

Physical Characteristics of Chromium Plate. On the basis that chromium may be plated in an unstable hydride form, according to Snavely the properties and structure of chromium plate may be examined in the light of calculations that indicate that the volume shrinkage attending the decomposition of the hydrides is over 15 per cent if a completely unstrained body-centered cubic lattice is assumed. When hydrides decompose, a considerable number of cracks may be observed to form, presumably caused by this shrinkage. Examination of the cross-section of a bright chromium plate, such as shown in Fig. 1, indicates that these cracks are perpendicular to the base metal surface and extend from the surface of the plate to the base metal. Fig. 2 shows a surface view of a typical bright chromium plate.

Snavely brought out the fact that his work checked the earlier work of others which had shown that in the plating of the common commercial variety of bright, hard chromium, the length of the inclusions in the chromium plate is influenced by the plating solution composition and the plating conditions. In addition, it was noted that, within the limits of the bright plating range, those constituents and conditions favoring a higher cathode film pH produce a plate with more and smaller cracks than those favoring a somewhat lower film pH.

Grain Size. According to Snavely, X-ray diffraction pattern studies have

Fig. 2—Surface of hard chromium plate showing crack system and nodular appearance (unetched surface x 200)
(Photo courtesy The Electrochemical Society)



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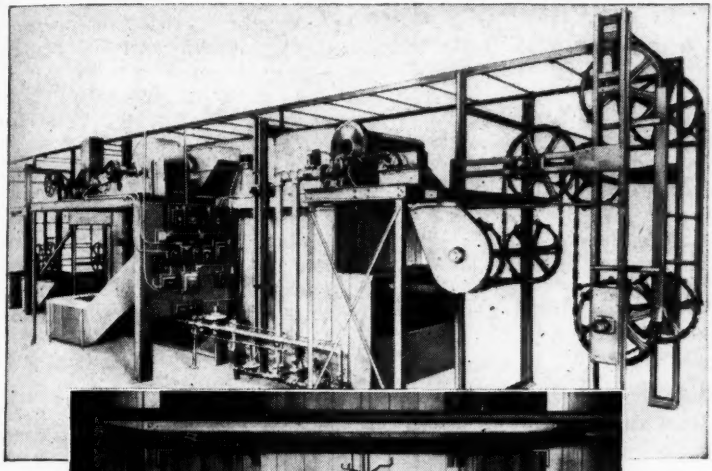

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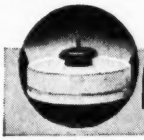

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shown the grain size of bright chromium plate to be of the order of 14 x 10^{-7} cm., whereas the smallest grains producible in metals by coldworking are of the order of 10^{-4} cm. in average diameter. This led to the conclusion that the grain size of chromium plate is an inherent property of the plate and that the grain size measurements were not confused by strained crystal lattices.

Thus, in the plating process, the first atoms to be deposited are considered to form crystal nuclei, about which subsequently deposited atoms arrange themselves in a regular fashion to build up the crystals which compose the finished plate. The grain size of the initial layer, it was pointed out, depends simply on the number of crystal nuclei formed, since each nucleus tends to grow in a direction parallel to the base metal until further growth in that direction is interrupted by contact with adjoining crystals. At the same time growth away from the base metal occurs and continues until interrupted. Interruption may occur by encroachment of a neighboring crystal, by formation of a new nucleus at the plate surface, which receives depositing atoms in preference to the established crystal, or by various other mechanisms which have been advanced to explain the phenomenon as observed in many instances. In the case of chromium plating, a new reason for the formation of new nuclei at the plate surface may be introduced. This new view involves the decomposition of the crystal nuclei after they have experienced only limited growth. This removal of the nuclei forces depositing atoms to form new nuclei which in turn decompose. Thus, a fine-grained structure is produced. According to Snavely, it appears also that the hardness of chromium plate is due mainly to the fine-grained character of the plate, and internal stress arising from occluded hydrogen and residual

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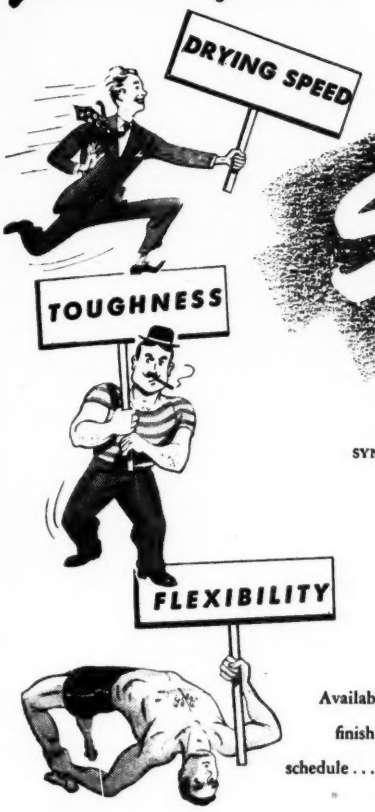

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stress from shrinkage accompanying hydride decomposition are considered to be but minor contributing factors.

Brightness. Snavely brought out that it is considered significant that the same plating conditions which produce the hardest plate also produce the brightest plate. This gives rise to the possibility that the same cause, the fine-grained character of the plate, may underlie both the hardness and brightness. In order to be bright a plate must be extremely fine-grained, or be composed of perfectly oriented crystals with a thickly populated plane parallel to the plate surface. Dull plates are generally thought to consist of coarse, randomly oriented grains, or of powdery aggregates which function in the same manner as coarse crystals in scattering light.

Chromium plate produced under conditions which were either above or below the bright plating range, it was pointed out by Snavely, produced dull or mat-surfaced plates which consisted of large crystals. The dullness is explained as a result of the amount and degree of stability of the hydride in the plate. At low deposition speeds below the bright range of temperature and current density, chomium plate is predominantly body-centered cubic in structure. This, according to Snavely, is a result of the low cathode film pH, with nothing occurring to interrupt the growth of the body-centered cubic crystals. In fact, conditions are ideal to promote their growth to relatively large size, and work of other investigators has shown that such plates consist of a considerable proportion of randomly oriented crystals. As a result, such plates have two reasons to be dull; namely, coarse crystals and lack of orientation. In summing up this respect of the research work, Snavely stated that fine grain size and near perfect preferred orientation are the basic factors accounting for the

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brightness of chromium plate.

Measuring the Ductility of Chromium Deposits. It was pointed out in a paper by M. R. J. Wyllie before The Electrochemical Society meeting, describing a method for measuring the ductility of chromium electroplates, that any practical "ductility" test for electrodeposits is in reality a test of

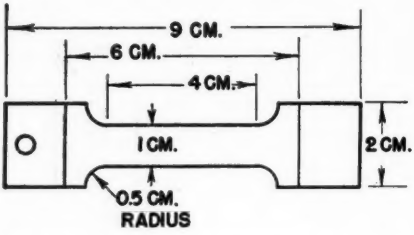


Fig. 3—Drawing of test piece used in measuring the ductility of chromium plate (*Drawing courtesy The Electrochemical Society*)

their ability to conform to the shape of the base metal, without cracking, when the latter is subjected to deformation. On this basis many of the commonly used tests of adhesion serve also as a measure of the ductility or the deformation ability of the deposit being tested. The work carried out by Wyllie was aimed at devising a more quantitative test for measuring the deformation ability of chromium electrodeposits produced directly on steel or ferrous material. According to Wyllie, the type of test best suited to quantitative development appeared to be that designated as "tensile straining," using a test specimen such as shown in Fig. 3, and measuring the extent of deposit cracking resulting from the elongation of the chromium plated test pieces. The elongating force was applied vertically to the test piece. Elongation was carried out to one per cent of the length of the test specimen. The Dubpernell test was adapted for assessing quantitatively both the initial porosity and cracking of the deposit through to the base metal after elongation.

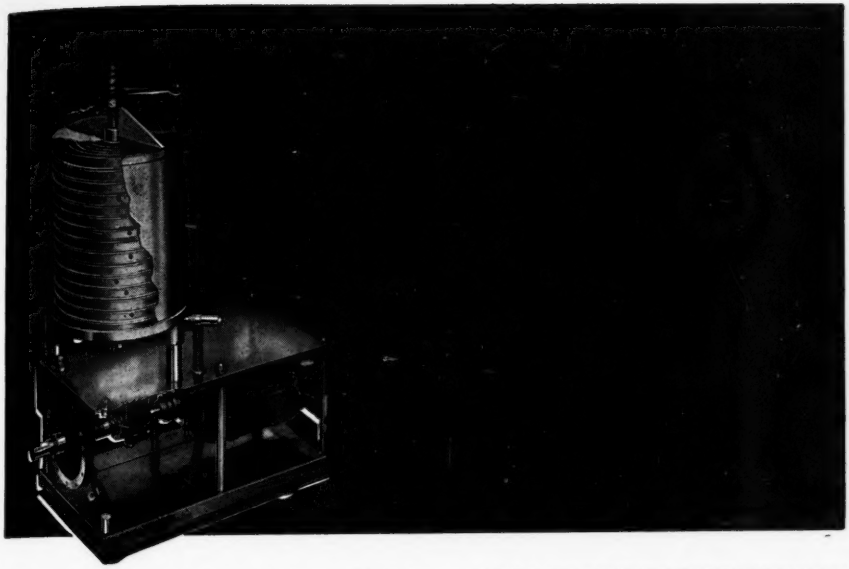
Fundamental studies such as these which were reported before The Electrochemical Society are of value to the finishing industry in casting new light on the importance of controlling the factors required for successful bright chromium plating, as well as providing a theoretical basis for future studies aimed at improvement of the process.

* * *

Formation of Black Oxide Coatings on Ferrous Articles

A procedure for producing a durable black oxide coating on ferrous metals by treatment at an elevated temperature in an aqueous solution made up of sodium nitrate and caustic soda has been reported by F. P. Heard, metallurgist, Standard Telephone and Cables Pty., Ltd., Sidney, Austrailia. The preferred salt for the production of the black chemical coating is a mixture containing 70 per cent sodium hydroxide and 30 per cent sodium nitrate, the two components, preferably, having been fused together and cast into molds producing lumps about 2 inches square by about 3 inches long. It was pointed out that this was the best form in which to obtain the salts, as it facilitates additions to the bath while in operation (see also "The Monthly Review," Sept. 1947).

In starting a new blackening bath about six inches of water is placed in the processing tank, which may be made up of welded mild steel, and heated to boiling. The salt in successive quantities is then placed in a basket and suspended in the boiling solution until dissolved, this process being continued until the concentration of salt reaches about 10 pounds per gallon. Processing may be carried out by the use of either a single or a two-bath treatment. The single-bath procedure



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consists of about a 30-minute treatment at a temperature of 290-300 deg. F.; the two-bath procedure involves a 15-minute treatment at 290 deg. F., followed by a 15 to 30-minute treatment at 315 deg. F. Coatings produced by the two-bath treatment have been found to provide better protection and wear resistance than those formed by the single-bath treatment.

Preparation of the metal for the blackening treatment consists of cleaning by the usual methods in vapor degreasers or hot alkali cleaners with or without current, by shot or sandblasting, sand tumbling, or pickling. Any combination of the above may be used, depending on the conditions of the metal surface and the requirements of the subsequent finish. The work may be strung on wires or placed in baskets or on racks. Maintenance of the blackening bath involves addition of salts to replenish dragout losses. The brown sludge which forms at the bottom of the tank should be removed after every 80 to 100 hours of operation. In some cases a good coating is not obtained immediately after a new bath is made up. It is reported that this difficulty is overcome by processing scrap metal for a day or two until good results are obtained.

After removal from the processing tank, the work should be thoroughly washed in cold running water, dried, and sealed in some way such as by painting, lacquering, waxing, or oiling. Dipping in hot soluble oil may sometimes be found to provide a satisfactory yet simple finish. The thicknesses of the coatings produced were reported to vary from approximately 0.00003 to 0.00004 inch.

* * *

Passivity of Corrosion Resistant Alloys

THE stainless steels are among the most popular of the corrosion resistant alloys used in metal product manufacturing operations. They are called passive alloys because they derive their corrosion resistance by virtue of a property called passivity, noted about 150 years ago in connection with iron made unreactive by immersion in concentrated nitric acid. Iron so treated in nitric acid retains passivity temporarily when transferred quickly to other corrosive media. Stainless steels, however, are stable with respect to passivity and thus are outstandingly resistant to dilute or concentrated nitric acid, and to many other media, and are only corroded appreciably by reagents effective in breaking down passivity, such as chlorides.

The mechanism of the passivity in stainless steels has been the subject of many research studies. Some factors related to the phenomena of passivity in chromium-iron alloys have been uncovered in research studies on passivity of chromium-iron alloys carried out by Dr. H. H. Uhlig at the

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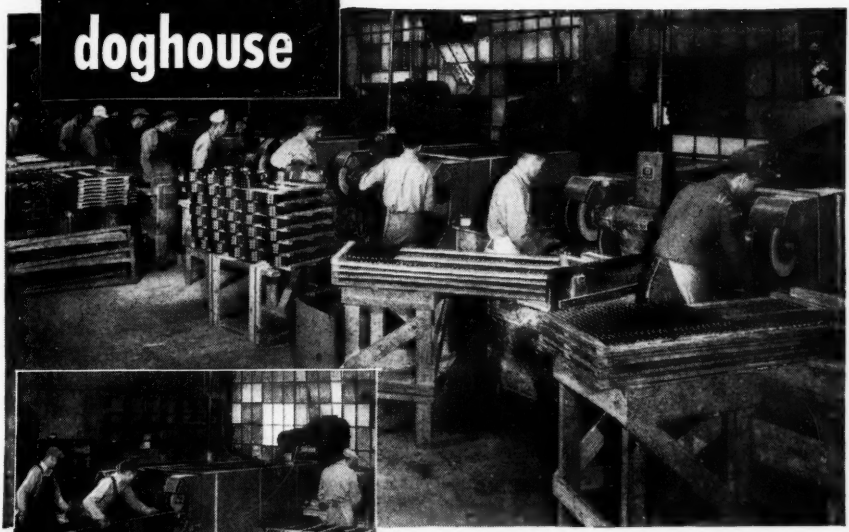

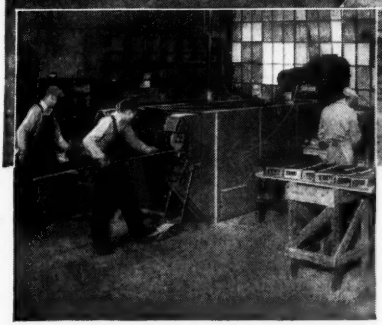

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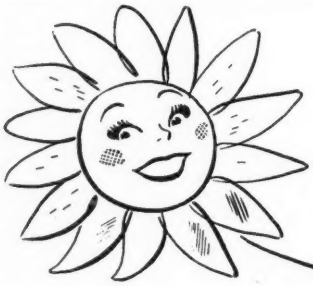
Massachusetts Institute of Technology. Certain of these findings were discussed in a paper before the 1947 National Metal Congress in Chicago. Thus, according to Dr. Uhlig, these studies indicate that chromium, by sharing electrons with iron in contact with it, can impart to iron the property possessed by chromium itself of chemisorbing oxygen or other elements and compounds. One result of such chemisorption, with its satisfaction of residual valences, is a sharp reduction of metal-surface reactivity.

Dr. Uhlig's study brings to the front a point which is of interest in considering plated metal finishes; namely, the possibility that the mechanism of surface diffusion and electron interaction, which is supported by his results, may account for the practical protection afforded by a very thin coating of chromium over nickel. Chromium coatings are very porous, but if the nickel or the chromium diffuses so as to ensure intimate contact wherever nickel is exposed, then there exists a passive layer of nickel at all portions of the nickel surface, even though the bulk of chromium may make contact at local areas only. The satisfactory protection of a commercial chromium coating, no more than 0.00001 to 0.00002 inch thick on nickel plated metal products, constitutes evidence that some such mechanism is probably operating.

The observed surface migration of iron on chromium at room temperature suggests one reason why metal coatings can be satisfactorily protective despite their evident porosity. Thus, it appears that the base metal may become covered with a monolayer or more of the protecting metal, whether or not pores in the coating reach to the surface of the base metal. Thus, according to Dr. Uhlig's passivity theory, because of electron interaction with the base metal, the met-



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* * *

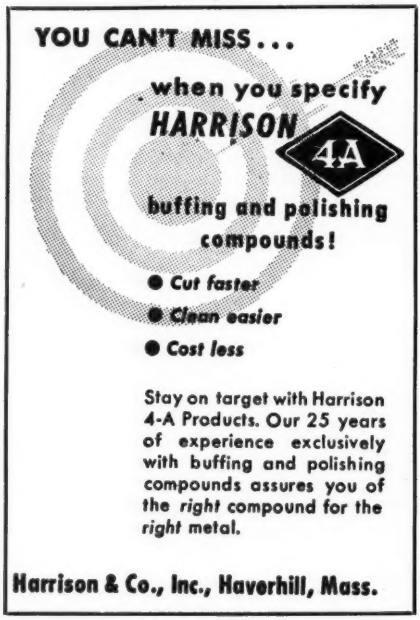
Spray Versus Brush Application Methods on Exterior Steel Surfaces

ACCORDING to Rick Mansell in a comprehensive discussion on painting of exterior steel surfaces in "Corrosion and Material Protection" (Sept.-Oct. 1947), there are differences of opinion as to the relative merits of brush versus spray application of paint to iron and steel structures. However, it is recognized that spraying is at least five times faster than brushing. It is also possible to apply thicker and more uniform coats by spray application, particularly on the corners, on the rivets, gratings, and other irregular or inaccessible surfaces. However, it was pointed out that under certain circumstances spray paints have less adhesion than brush coatings. This is particularly the case under conditions of low temperature or of high humidity.

The reason for this, as pointed out by Mansell, is that when the sprayed paint reaches the metal surface it has a temperature lower than the atmospheric temperature, due to a cooling process induced by the quick evaporation of the solvents. Thus, if the external temperature is already close to the dew point then actual moisture condensation may occur both inside the paint film and on top of its surface.

One other point indicated is that when a paint is applied by brushing, it will adhere more satisfactorily over surfaces which contain dirt and grease. This is because the brushing tends to mix these foreign substances into the paint itself. A spray paint will tend to remain on top of these ingredients and will therefore be prevented from direct bonding with the metal surface.

Thus, as a conclusion to evaluation of this phase of the coating problem, it was brought out that in favorable weather, with normal temperatures and low humidity, it is absolutely safe to take advantage of the lower cost of spray application. However, in those cases where the temperature and humidity are at all doubtful then, as a general rule, brush methods are to be considered safer procedures.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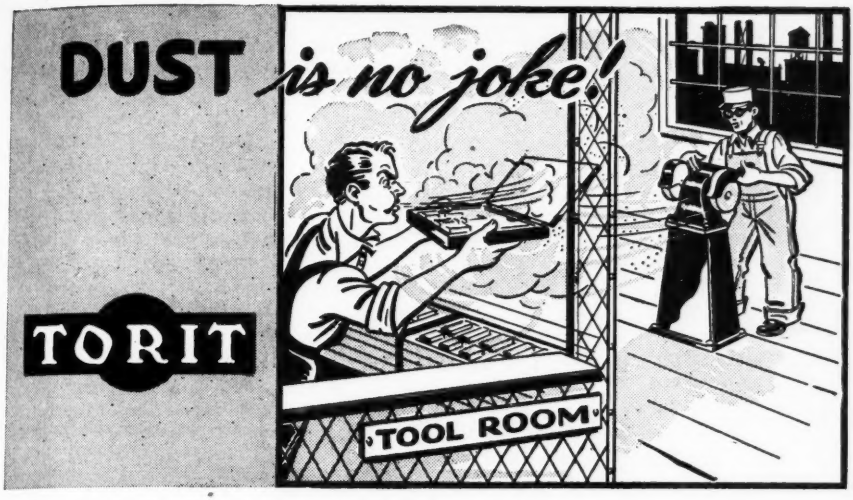

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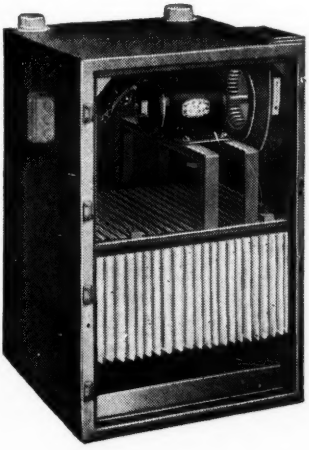

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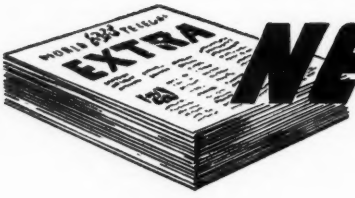


NEWS of the Industry

Process Control Men Complete Ferro Training Course

Eighteen porcelain enameling process control men, representing many leading porcelain enameling plants in the country, have recently completed a two weeks' training course at the Ferro Enamel Corp., Cleveland, Ohio. According to Dr. G. H. McIntyre, Ferro's director of research and training course supervisor, the accomplishments of the students can be considered outstanding.

At Ferro's laboratories, the "trainees" studied many phases of porcelain enamel shop control practice, including fundamental chemistry in the porcelain enameling industry, control of pickling solutions, control of milling, dipping, spraying and firing of enamels, and control of furnaces and furnace atmospheres. In addition, members of Ferro's research staff discussed the technical aspects of enamel properties with respect to adherence, opacity, color control, and surface characteristics.

Classroom exercises included lectures, visual aids, demonstrations, and actual performance of the control operations by the students. New instruments for measuring furnace operating conditions were

Training School Graduates and Instructors: (Top row, left to right) H. P. (Hal) Connare (Ferro) in charge of school, Henry Kiermasz (A. J. Lindemann-Hoverson Company), Franklin Seeley (Gibson Refrigerator Company), Louis George (Porcelain Steel Corporation), Claude Boots (Intenational Harvester Company), Robert Smart (Mt. Vernon Furnace Company), Frank Strey (Co-Operative Stove Company), and Dr. G. H. McIntyre. (Middle row, left to right) William Lawrence (Perfection Stove Company), Klare Gibbs (Ferro), Richard Tippen (Ferro), Clifford Clodfelter (International Harvester Company), Harold Wilson (Vitreous Steel Products Company), and Robert L. Taylor (Glenwood Range Company). (Front row, left to right) Donald Andrews (Strong Mfg. Company), Bryant McCarthy (Union Enamel Company, South Africa), Robert Smith (Hussmann Refrigerator Company), Thomas Nunley (Texlite Company), Joseph Hyland (Ferro), Henry Cassabaum (A. J. Lindemann-Hoverson Company), and Melbourn DeJarnett (International Harvester Company). Robert Plunkett, Jr. (Bettinger Enamel Corporation) was not present when the picture was taken.

displayed and demonstrated. Students were brought up to date on the latest developments in porcelain enamels and enameling techniques. At the conclusion of the instruction period, students were required to pass comprehensive examinations after which they were presented with certificates.

First row (left to right) A. J. Bettelheim, Eastern Region; Horace A. Gage, assistant to Mr. Robinson; Carter B. Robinson, sales vice president, Ford Division; C. W. Troxell, Central Region. Second row (left to right) G. H. Eldridge, North Central; P. S. Spencer, sales manager, Pacific Division; T. N. Jones, Southern; G. T. Robinson, Northwestern; and G. H. Wood, Midwestern.

Wyandotte Chemicals Regional Supervisors' Conference

Wyandotte regional supervisors recently held a week's conference during which plans were made with Carter B. Robinson, vice president in charge of sales, for the seven sales meetings now being held for the more than 200 representatives of the J. B. Ford Division of the Wyandotte Chemicals Corp., Wyandotte, Michigan.

One of the highlights of the conference was a plant trip to several new manufacturing units which comprise the $25,000,000 Expansion Program of Wyandotte Chemicals Corporation.

Webster B. Todd Elected to Executive Committee

Webster B. Todd, formerly chairman of the board of Todd & Brown, Inc., was recently appointed to the executive committee of American Wheelabrator & Equipment Corp., Mishawaka, Ind. Mr. Todd is also a member of the board of directors.

The firm of Todd & Brown, Inc., together with the firm of Todd, Robertson & Todd, since dissolved, planned and supervised the construction of Rockefeller Center and the Williamsburg, Virginia colonial village restoration. During the war, the firm operated the Kingsbury Ordnance Plant at LaPorte, Indiana.

Mr. Todd is also a director of the Metropolitan Life Insurance Company, The Equity Corporation, American General Corporation, First York Corporation, The First National Bank of Jersey City, New Jersey, and a trustee of Stevens Institute of Technology.

Appointed Chromium Chemical Sales Manager

J. C. McKenna has been appointed manager of chromium chemical sales for the Diamond Alkali Co., Cleveland, Ohio, according to an announcement made by sales vice president, Fred W. Fraley.

Mr. McKenna, associated with Diamond for the past 26 years, will have charge of selling a considerable portion of the nation's total supply of chromium chemicals. The sale of these products through Prior Chemical Corporation of New York has been discontinued, in line with Diamond's policy of selling its primary chemical products directly through the company's branch sales offices, and chemical merchants.

Alvey-Ferguson Chicago Representative

The Alvey-Ferguson Co., Cincinnati, Ohio, has designated the De Greneer

Corp., Chicago, Ill. as representative in the Greater Chicago area, according to Donald P. Smith, sales manager of the industrial washing machine division. The De Greneer Corporation will further extend the sales facilities of the Alvey-Ferguson Company and will provide prompt service to industries in the Chicago area.

Paint Firm Head Dies

Milton A. Mass, president of the Mass & Waldstein Co., Newark, N. J., manufacturer of paints, varnishes, and allied products, died March 30 at the age of 76. Born in New York, Mr. Mass was associated with the Mass & Waldstein Company for 57 years, the last 25 years as president.

An alumnus of City College and a member of various clubs and societies, Mr. Mass was recently the recipient of a special award for pioneer work in paint and varnish manufacture bestowed upon him by the New York Paint, Varnish and Lacquer Association.

Named Sales Representative

F. E. Jones has been appointed sales representative for the Eastern Central states by Michigan Chrome & Chemical Co., 6340 E. Jefferson Ave., Detroit 7, Mich. He will serve electroplating organizations in the states of Ohio, Kentucky, West Virginia, Western Pennsylvania, Western New York State, and Canada.

F. E. Jones

Mr. Jones was associated with the Veterans Administration as a training specialist, supervising veteran metal trade training in the Detroit area. Previously, he saw infantry service with the Marines in the Pacific theatre, receiving the Purple Heart for wounds suffered at Bougainville.

Mr. Jones attended Wayne University, majoring in business administration.

Personnel Manager at Zapon

Dan S. Reese has been named to the post of personnel manager for the Stamford, Connecticut plant, Zapon and Zapon Keratol Divisions, of the Atlas Powder Company, according to E. H. Bucy, general manager of both divisions.

Dan S. Reese

Mr. Reese, a graduate of the University of Illinois, who has taken post graduate work at the University of Delaware and Temple University, was, until recently, with the Hercules Powder Company as personnel superintendent of its Louisiana, Missouri plant.

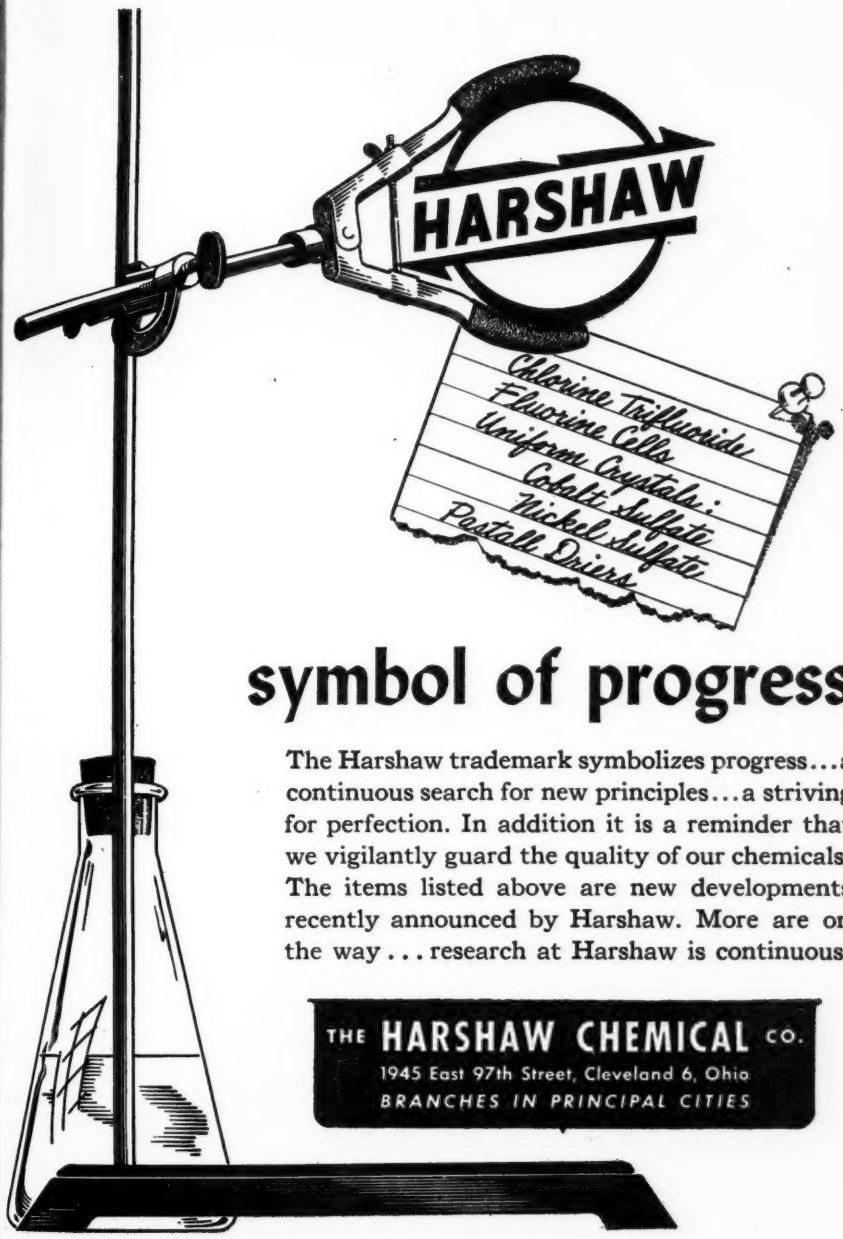
Pennsalt Personnel Appointments

Five personnel appointments in the research and development department of the Pennsylvania Salt Manufacturing Company have been announced by the company.

The following appointments have been made: J. Philip Evans as assistant to S. C. Ogburn, Jr., manager of research and development; Clifton R. Neumoyer as senior research chemist in the research division; Harold L. Warner as associate patent attorney; Joseph Simkin as research chemist in the special products division; and Charles A. P. vonHemert as junior chemical engineer, development division.

Allied Finishing Sales Representative

Roy B. Story has joined the sales staff of Chicago Bronze & Color Works, 2601-7 W. Grand Ave., Chicago, Ill., division of Allied Finishing Specialties Company. He will represent the firm in calling on both dealer accounts and industrial users in the Northern Indiana and Southern Michigan territories.



symbol of progress

The Harshaw trademark symbolizes progress... a continuous search for new principles... a striving for perfection. In addition it is a reminder that we vigilantly guard the quality of our chemicals. The items listed above are new developments recently announced by Harshaw. More are on the way... research at Harshaw is continuous.

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

(Left to Right) Cyrus W. Craig, Clayton Casler, Harris G. Beck, Jr.

Zapon Promotions

According to an announcement made public by Casper Apeland, general manager of the Atlas Powder Company's North Chicago, Illinois Zapon Division plant, the following promotions have been made:

Cyrus W. Craig is now assistant general manager in charge of methods, accounting and costs. Clayton Casler, formerly assistant general sales manager, has been made general sales manager. F. H. Apeland, who has been with the organization since 1933, was named manager of the North Chicago Zapon plant. Mr. Apeland first joined the Zapon Division of the Atlas Powder Company as purchasing agent and cost accountant, having previously been affiliated with the Brevolite Lacquer Company.

Harris G. Beck, Jr., has been promoted to technical director of Zapon's North Chicago plant, and also has been placed in charge of the sales engineers whose work is an important function of the merchandising and service programs.

A.E.S. 35th Annual Convention

According to an announcement made by the Newark Branch, plans for the 35th Annual Convention of the American Electroplaters' Society to be held in Atlantic City, New Jersey, from June 28 to July 1, are nearing a final stage. The headquarters for the Convention will be the Ambassador Hotel.

Important features of the Convention will include (1) technical sessions at which approximately 16 highly educational and very pertinent papers will be presented; (2) the Industrial Finishing Exposition which is scheduled to be held in the huge auditorium in Atlantic City Convention Hall, and will include large displays of equipment and supplies for electroplating, polishing, buffing, cleaning, degreasing, washing, rinsing, lacquering, and enameling; (3) an exhibit at the Convention Hall of plated ware of unusual design featuring commercial and specialized finishes; and (4) social activities consisting of an excellent program for the entertainment of the ladies while the men are occupied with the business and educational activities of the Convention. As a climax to all preceding activities, the concluding social event will be the main banquet.

Roland H. Mueller

Roland H. Mueller, formerly chief chemist at Bell & Howell Company, Chicago, has joined the laboratory staff of Allied Finishing Specialties Company, industrial coatings manufacturer, 2639 W. Grand Ave., Chicago, Ill. Mr. Mueller's new duties will include the testing of raw materials and finished products, formulation of new and improved products, and general technical advice on finishes and finishing problems.

Mr. Mueller received his degree in engineering science from the Armour Institute of Technology and was associated with Bell & Howell for six years before joining Allied Finishing Specialties Company.

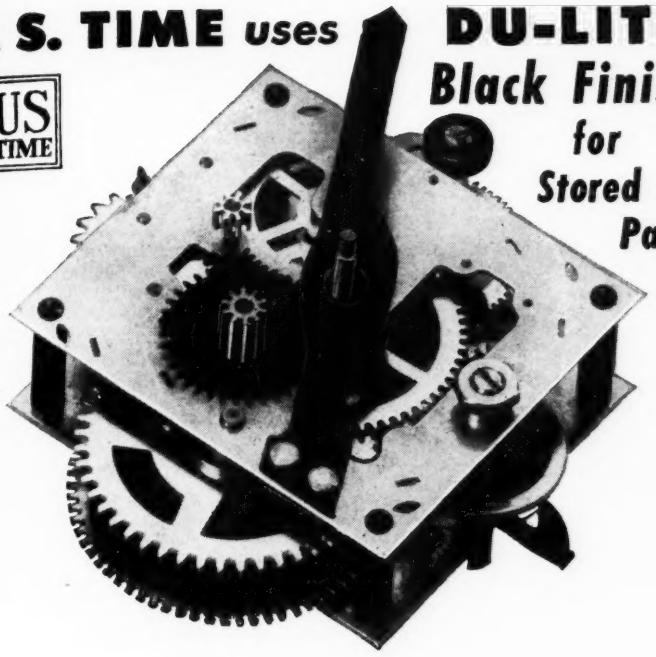
District Sales Representative

The Pennsylvania Salt Manufacturing Company has announced the appointment of Charles R. Sorber, Jr., as St. Louis, Missouri district sales representative for Pennsalt's Special Chemicals Division.

Mr. Sorber, a graduate mechanical engineer from Pennsylvania State College, joined Pennsalt last September. Prior to that time, he was a sales engineer with Proctor & Schwartz, Inc.

U. S. TIME *uses* DU-LITE *Black Finish for Stored Steel Parts*

US TIME



To protect its steel clock parts from the ravages of rust while they are stored before assembly, U. S. TIME—a leading manufacturer of fine watches and clocks—processes those parts with DU-LITE, the dependable black finish for steel.

DU-LITE imposes on those steel clock parts a protecting oil-absorptive finish without any dimensional change and without any change in the critical characteristics of the parts. DU-LITE does it quickly, positively, inexpensively, conveniently.

DU-LITE has the answer to your black-finishing problems. Call or write us. A DU-LITE Engineer will call at your convenience.

DO IT RIGHT WITH DU-LITE

THE *Du-Lite* CHEMICAL CORPORATION

100 River Road . . . Middletown, Conn.

Capalbo Joins Interchemical

Albert J. Capalbo, well-known plastic coatings technician, has joined the Flexible Plastic Coatings Department of Interchemical Corporation's Finishes Division, according to a recent announcement by Chester M. Robbins, head of the department.

Albert J. Capalbo

Mr. Capalbo brings to Interchemical a background of more than 12 years in the field of flexible plastic coatings. During World War II, he worked as a chief chemist with a coatings manufacturer producing materials for life rafts, ponchos, and weatherproof saillcloth for the armed services. He also took an active part in the development of improved vinyl coatings.

In his work with the Flexible Plastic Coatings Department, Finishes Division, Mr. Capalbo will serve in both a sales and technical service capacity with headquarters in Elizabeth, New Jersey.

Joins Sales Staff

Kenneth E. Rigtoft of Chicago, well known in the field of industrial finishes, has joined the sales staff of Allied Finishing Specialties Co., 2637 W. Grand Ave., Chicago 12, Ill. His territory will embrace the city of Chicago and nearby manufacturing centers.

Mr. Rigtoft has been sales representative for the Hilo Varnish Corporation, Brooklyn, New York, for the past seven years, covering the Midwest territory. Prior to that time he was connected with the Martin-Senour Corporation for several years. Altogether, he has spent more than seventeen years as a salesman of industrial coatings.

Two Chemists Join Chicago Vit

B. T. Sweely, vice president and director of research, Chicago Vitreous Enamel Product Co., Cicero, Ill., has announced the addition of Otto C. Linhart, B.S., and Gordon S. Douglas, B.A. and M.S., to the Chicago Vit Research Laboratories staff, Chemical Division.

Mr. Linhart obtained his bachelor's degree in physics from the Illinois Institute of Technology in January 1948. He served in the Army for 4½ years and was overseas in the Southwest Pacific for 34 months as a laboratory technician.

Mr. Douglas, who is a graduate of U.C.L.A., spent a year with the Douglas Aircraft Company and 2½ years as a chemist with the Goodyear Synthetic Rubber Corporation at Torrance, California. For the past two years he has been doing graduate work and instructing in chemistry at Purdue University, where he recently received his master of science degree.

Appointed Chief Engineer

Julius W. Marx was recently appointed chief engineer at Newcomb-Detroit Co., Detroit, Mich., engineer and manufacturer of dust arresting equipment and finishing systems.

Mr. Marx graduated in engineering from Michigan State College. He later joined the engineering staff of Fisher Body Division of General Motors. More recently, as plant engineer at General Motors Truck and Coach Division, Mr. Marx gained wide experience in the application and operation of all types of dust arresting and finishing equipment.

Julius W. Marx

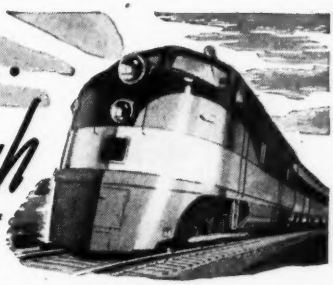
Field Engineer Appointed

A. O. Anderson has been appointed senior field engineer of the Western Division of the Rack Engineering Co., Pittsburgh, Pa., according to an announcement by Samuel Saul, Jr., president.

Mr. Anderson was formerly production control manager of Ditto, Inc., Chicago, and prior to that time was associated with the Douglas Aircraft Company and the Lockheed Aircraft Corporation.

READY FOR HER DEBUT . . .

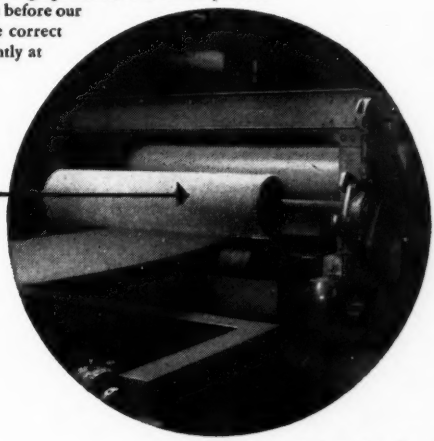
thanks to Pittsburgh



HERE'S WHAT HAPPENED:—Today's streamlined trains need big tonnages of high finished metal. One of the nation's leading strip producers ran into trouble with his brushes—brushes which burnish strip rolling, under high pressure, at 40 miles per hour Like many other industrialists, he put his problems before our skilled brush engineers. Pittsburgh selected the correct perfect balanced brush that would work efficiently at the required speed.

This is the Pittsburgh brush that did the job!

The brush had to be stiff enough and tough enough to resist abrasion; yet soft enough to improve the surface texture. Thus another industrial brush problem was solved by Pittsburgh! You too, can always depend on Pittsburgh to solve your brush problems. The efficiency and performance of Pittsburgh Power-Driven Brushes are tested and proved day after day by strip producers all over the country.



There's a Brush by Pittsburgh for *Every* Industrial Use—

GLASS	AUTOMOBILE	TIRE & RETREADING
STEEL	RUBBER	SHOE MANUFACTURING
PLASTICS	PAPER	& REPAIRING

In the complete Pittsburgh line are brushes of all types, including "Perfect Balance" sections, wheels and assemblies. Uni-fill scratch brushes as well as paint and other maintenance brushes. Consult the Pittsburgh engineering representative. He will gladly work with you in developing any type of power-driven brushes to meet your particular finishing specifications.

Use only Power-Driven Brushes By Pittsburgh—it pays

You can depend on Brushes by Pittsburgh to meet your particular finishing requirements. Perfect balance, top performance, enduring economy and a minimum of lost time in changeovers–Pittsburgh Power-Driven Brushes are specifically engineered to do your job right.

FREE!

Steel rule and depth gauge, 6", complete with pocket clip, and attractive leather case. Yours for the asking . . . write Pittsburgh Plate Glass Company, Dept. W-5, Baltimore 29, Md.

Power Driven **BRUSHES**

BRUSHES · PAINT · GLASS · CHEMICALS · PLASTICS

PITTSBURGH PLATE GLASS COMPANY

Cunningham Appointed Technical Representative

Harrison & Co., Inc., Haverhill, Mass., buffiing and polishing compound manufacturer, has announced the appointment of Gheen Cunningham as technical representative. He will be available for technical assistance on problems pertaining to polishing, compounds, and cement.

Gheen Cunningham

Mr. Cunningham, a University of Pennsylvania graduate, is well grounded in the buffing and polishing field, having spent five years with Du Pont as a technical field representative, as well as several years as foreman and supervisor of polishing departments in plants.

Regional Manager

The Metal-Clean Solvent Corp., Chicago, announces the appointment of Ernest Gerhart as Eastern regional manager. Mr. Gerhart was formerly metallurgist contact representative of the U. S. Steel Corporation; chief metallurgist of the Reliance Division of the Eaton Manufacturing Company; and more recently, chief metallurgist of the Ingersoll Steel Division of the Borg-Warner Corporation. He will make his headquarters at Metal-Clean's home office, 1935 N. Paulina St., Chicago, Illinois.

Glidden Expands San Francisco Plant

Completion of a $300,000 expansion program at the San Francisco plant of the Glidden Company has been announced by E. L. Ehrke, regional director.

The new Glidden facilities include a plant designed for the manufacture of alkyd resins and for varnish and oil processing. New equipment will make possible the production of varnish in 2,000-gallon lots, "cooked" by indirect heating.

The San Francisco work is part of a $1,000.000 expansion and modernization program which also involves other major Glidden paint plants.

Elected Vice President

The directors of the C. A. Woolsey Paint & Color Co., Inc., 229 E. 42nd St., New York 17, N. Y., have elected J. L. Plowright to the office of vice president in charge of sales, according to an announcement made by C. Edward Raabe, president. Mr. Plowright is well known in trade circles and has been active in the paint field for more than twenty years.

Named General Manager

A. I. Pruett has been appointed general manager of The Thresher Paint and Varnish Co., Dayton, Ohio, according to an announcement by E. D. Griffith, vice president in charge of Pittsburgh Plate Glass Company's paint division. Thresher Paint is an affiliate of the Pittsburgh firm.

A native of Pittsburgh, Mr. Pruett for more than 25 years was associated with the Pruett-Schaffer Chemical Company, a Pittsburgh concern. He joined the paint division of Pittsburgh Plate in 1946.

A. I. Pruett

Ferro Opens New Clay Plant

The Ferro Enamel Corp., Cleveland, Ohio, has announced the opening of its new clay processing plant at Nashville, Tennessee.

The new plant is part of Ferro's extensive program of clay research initiated in 1929. Ferro, through its research program, has been instrumental in the development of domestic clays, with the result that the porcelain enameling industry in the United States now has access to blended clays which are the equal of imported Vallendar clays.

HOW TO *Quadruple the life* OF YOUR RINSE TANKS for less than 25c a square foot!*

YES, you can actually multiply the life of your hot and cold rinse tanks four times or more, by coating them inside and out with Tygon Plastic Paint Coatings.

Tygon Plastic Paint is a liquid form of Tygon sheet stock, the rubber-like plastic recognized by chemical and metallurgical engineers as the very top in quality lining. In its liquid form Tygon is applied by spray or brush to metal or concrete. It air dries quickly, forms a tough, durable, chemical-and-water-resistant plastic film.

This sturdy Tygon film provides real protection against rust and corrosion — multiplies tank life four times or more — and at a cost of less than 20c a square foot.

**Including materials and labor.*

Order a Tygon Trial Kit: 1 quart Tygon Primer, 1 quart Tygon Top Coat (specify color: white, black, clear, gray, green, aluminum) and 1 pt. Tygon Thinner—all for $6.00, F.O.B. Ravenna, Ohio.

PROCESS EQUIPMENT DIVISION

U. S. STONEWARE

Akron 9, Ohio

Ferro Appoints Jaeger Nashville Sales Manager

C. D. Clawson, president, Ferro Enamel Corp., Cleveland, Ohio, announces the appointment of Roy H. Jaeger as manager of Ferro's Nashville sales territory.

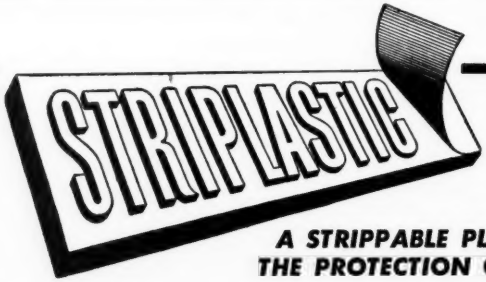
Mr. Jaeger is well known in the porcelain enameling industry, having been associated with the field for many years. From 1942 until 1945 he served with the War Production Board in St. Louis, terminating his service in the capacity of chief facilities officer. Late in 1945 he joined Ferro Chemical Corporation, a Ferro Enamel Corporation subsidiary, as St. Louis district manager.

Mr. Jaeger succeeds Mr. Paul Kates as Nashville district manager.

Technical Bibliographies at Battelle

Numerous rare and unpublished bibliographies on scientific and technical subjects are now available to industry as the result of the formation of a pool of unpublished bibliographies by the Special Libraries Association. The pool is housed in the library of Battelle Institute, Columbus, Ohio, from which loans of the bibliographies are made. Anyone interested in obtaining the complete listing of the bibliographies should write Ralph H. Hopp, technical librarian of the Battelle Library, who serves as chairman of the SLA Bibliography Committee. His committee is also interested in the possible inclusion of other unpublished bibliographies in the pool.

Electro-Tech Catalog No. 48. A 66-page illustrated catalog describing standard makes of instruments and controls has been announced by Electro-Tech Equipment Co., 117 Lafayette St., New York 13, N. Y. Included in the catalog are specifications and prices on the various control instruments together with suggestions concerning the use of such equipment. Some of the instruments described are pyrometers, pyrometric controllers, recorders, thermocouples, electronic meters, transformers, rectifiers, rheostats, and relays. Copy of Catalog No. 48 free upon request.



A STRIPPABLE PLASTIC FOR THE PROTECTION OF METALS

Striplastic is a protective plastic applied by spraying, dipping or rolling. It is used on stainless steels, high polished metal sheets, sheets in cold working or drawing, tools, dies and parts, and on sheets or metal parts before packaging. It protects against scratching and abrasion, and against rust.

Among many advantages, it is non-toxic, possesses great tensile strength and is easily stripped off in one piece.

Write for complete information on this new strippable plastic.

THE STRIPLASTIC COMPANY

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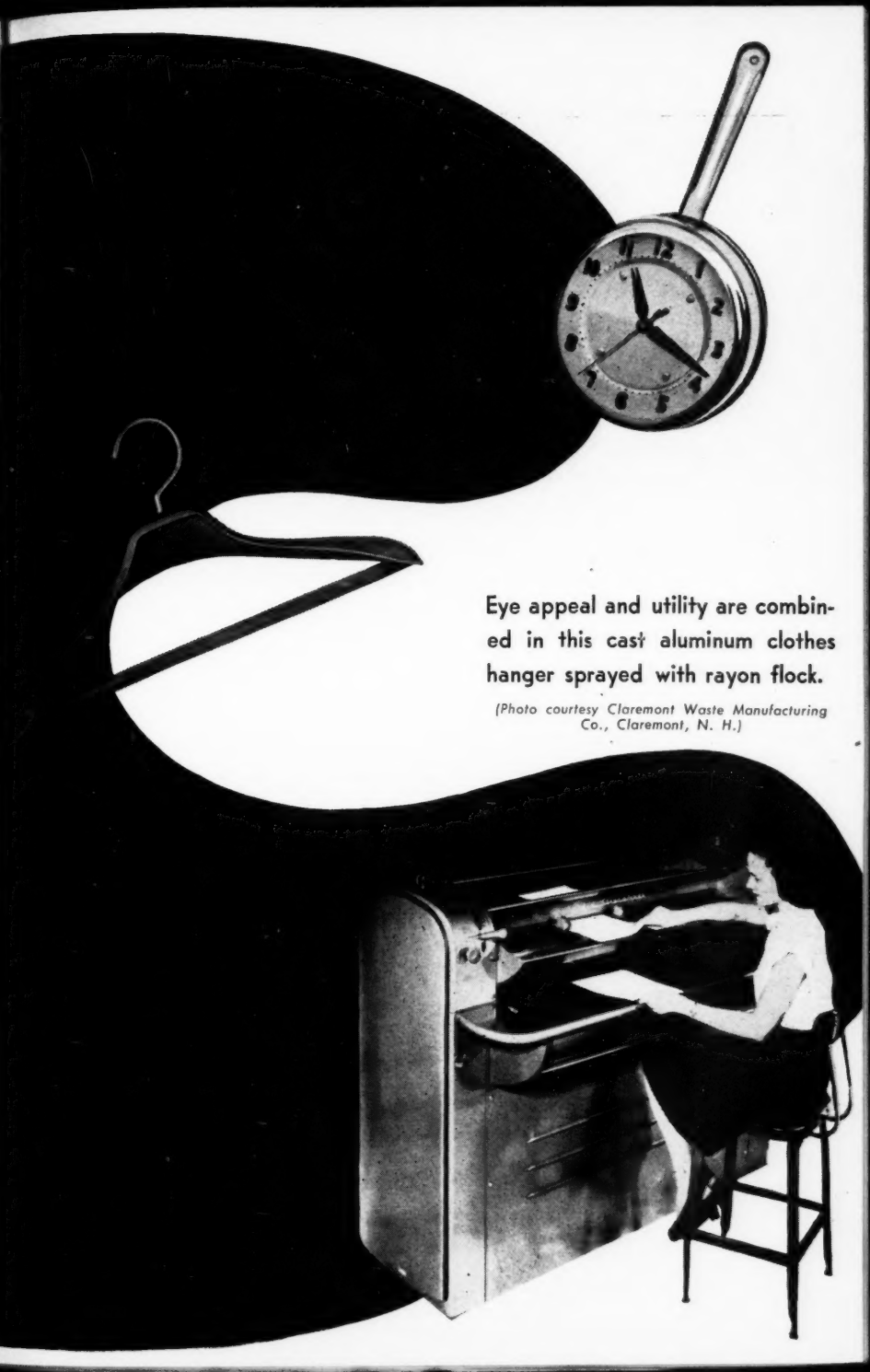
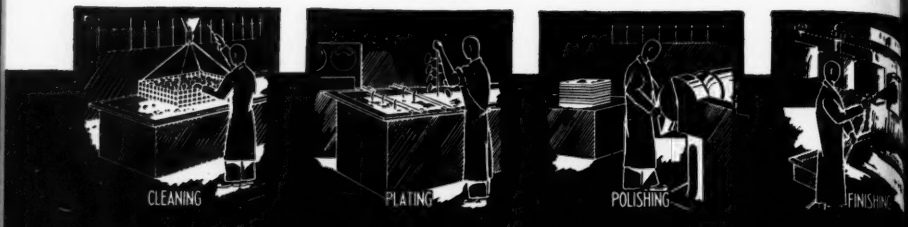


Eye appeal and utility are combined in this cast aluminum clothes hanger sprayed with rayon flock.

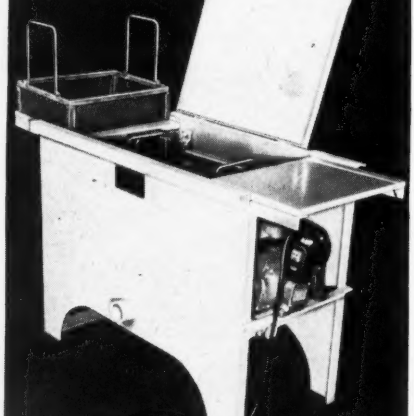
(Photo courtesy Claremont Waste Manufacturing Co., Claremont, N. H.)



"Klene-ezy" Parts Cleaning Machine

A parts cleaning machine designed to provide for fast and thorough removal of grease, oil, sludge, carbon, or other deposits has been introduced by the Cincinnati Cleaning & Finishing Machinery Co., Ironton, Ohio. Designated as the "Klene-ezy," the machine is designed to provide efficient and economical cleaning for metal working plants and repair shops.

According to the manufacturer, cleaning efficiency is gained because of the solvent action provided by the scientifically engineered agitating mechanism. The Klene-ezy Machine can be used for hot or cold washing and has convenient drains in addition to provision for reclaiming contaminated solution, it is claimed.



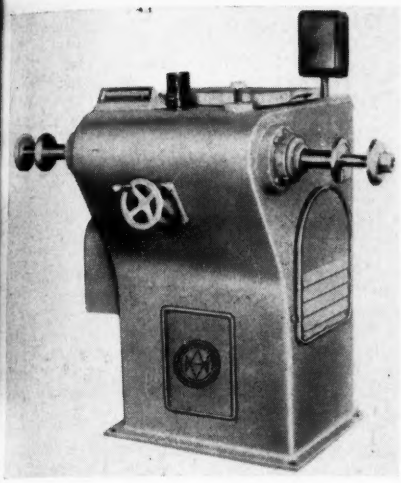
"Klene-ezy" Parts Cleaning Machine

"Stop-Off" for Selective Tin Plating

The Acheson Colloids Corp., Dept. 14, Port Huron, Mich., announces a coating material which is claimed to perform ideally as a "stop-off" for selective hot dip tin plating. The coating can be easily applied to that portion of a surface where it is desirable or necessary to prevent adhesion of the tin, and is said to readily withstand a muriatic acid pickling bath used in tin plating operations, as well as the fluxing dip and molten tin dip.

Type MSV Variable Speed Polishing Lathe

The Hanson-Van Winkle-Munning Co., Matawan, N. J., has announced that Type MI and Type MS polishing lathes in 3, 5, and 7½ h.p. sizes can now be supplied with variable speed arrangement. A conveniently located handwheel pro-



Type MSV Variable Speed Polishing Lathe

vides for speed variation from 1,800 to 3,600 revolutions per minute.

The spindle speed is governed by a variable pitch motor pulley and a single, wide V-type belt. The calibrated control is used to move the motor and pulley assembly which changes drive centers, with the belt tension automatically maintained.

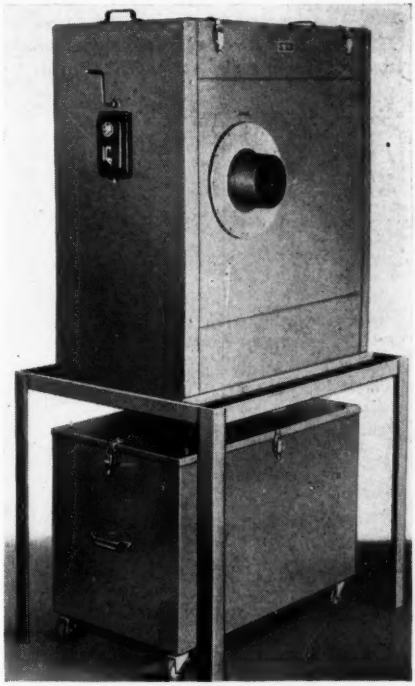
According to the manufacturer, features of the variable speed polishing lathe, which is designated as the Type MSV, include strong welded steel base, magnetic starter, pressure-lubricated self-aligning bearings for spindle, easily reached start-stop push button, standard N.E.M.A. ball bearing, and open squirrel cage motor protected by the steel base yet provided with adequate ventilation. It is claimed that the variable speed arrangement provides increased flexibility of operation and extends the range of products which the machine will finish.

"Dustkop" Model 11B50 Dust Collector

Identified as the "Dustkop" Model 11B50, a self-contained unit type dust collector with large volume dust shortage capacity for dust collecting operations where large volumes of dust, lint, chips, and so on, are involved has been brought out by the Aget-Detroit Co., 207 Main at Washington, Ann Arbor, Michigan.

For collecting and storing dust, the unit employs a roll-a-way bin with clampdown cover which permits easy removal of the dust to the point of disposal. To remove the collected dust, the four latches holding the lid in position on the bin are released so as to permit the lid to move up clear of the bin where it is suspended by four springs. The connection between the unit and the lid comprises a flexible sleeve. After the contents of the bin are disposed of, the lid can be again fastened in position by latching down the fasteners. The bin is equipped with swivel casters and handles at each end.

The actual suction capacity of the Dustkop Model 11B50 Dust Collector on a 6-inch inlet is 1,394 c.f.m. at 3.2 static suction, the suction being developed by a 1½ h.p. 3,450 r.p.m. continuous duty motor, direct driving a non-clogging paddle wheel type fan. A cyclone separator of high emciency contained within the unit



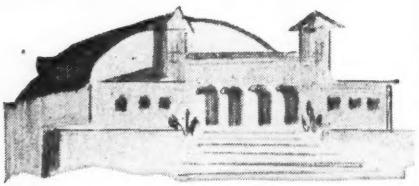
"Dustkop" Model 11B50 Dust Collector

ATLANTIC CITY
by-the-sea

JUNE 28 TO JULY 1

INDUSTRIAL FINISHING EXPOSITION

A comprehensive exhibit of equipment and supplies for manual and automatic electroplating, polishing and buffing, cleaning and degreasing, tumbling and burnishing, enameling and lacquering, and allied processes. Of interest and value to all manufacturers concerned with metal surface treatment.



Make plans now to attend this Exposition and Convention. Exposition and Technical Session in Atlantic City's Convention Hall; Convention Headquarters in Ambassador Hotel. Sponsored by the A.E.S. Newark Branch.

For further information, write

American Electroplaters' Society

NATIONAL OFFICE,

P. O. BOX 168, JENKINTOWN, PA.

subjects the dust laden air to its first cleaning after passing through the fan. A second-stage filter of non-inflammable spun glass forms the top of the unit and provides for a second-stage cleaning of the air before it is returned to the working area. Regular shake down of the filter can be effected by means of a hand crank which is conveniently located and easily operated by maintenance or production personnel.

Norfolk Chrome-Aluminum Enamel

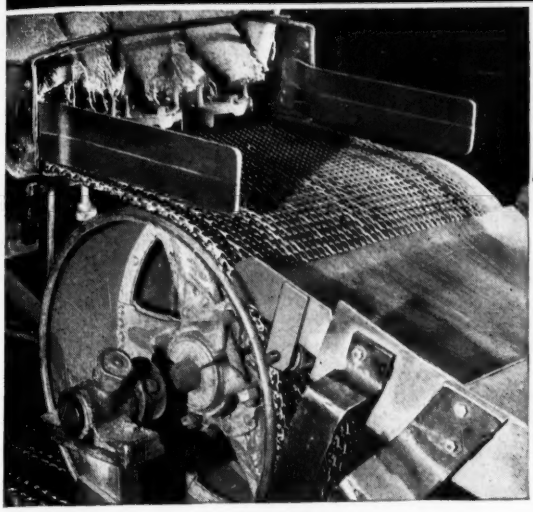
Said to feature unusual brilliance together with extremely tough adhesiveness, a 10-minute bake chrome-aluminum enamel for decorative and protective purposes is announced by the Norfolk Paint & Varnish Co., Quincy 71, Mass. According to the manufacturer, the enamel achieves the effect of polished chromium with all of the high reflective quality of silver. Due to its unusual flowing and leafing properties, the material is said to assure one-coat coverage of most surfaces.

As a product coating, Norfolk Chrome-Aluminum Enamel is claimed to be outstanding because of its phenomenal non-settling non-graying characteristics when allowed to stand in a dip tank or spray reservoir. Designed to provide for maximum economy, the material can be thinned with one part of mineral spirits to two parts of chrome-aluminum enamel without affecting its one-coat hiding capacity. The enamel may be applied by the spray, dip, brush, or tumble method and may be baked over a wide range of temperatures of from 10 minutes at 350 deg. F. to 30 minutes at 250 deg. F. The material is also available as a one-hour air-dry finish for use either as a product coating or as a maintenance aluminum finish upon surfaces where its properties find application.

"Sel-Rex" Style 5009 Rectifier

Designed to provide an economical source of direct current up to 5,000 amperes with voltages varying from 1 to 9 volts, the Sel-Rex Style 5009 Rectifier has been announced by the Bart-Messing Corp., 45 Morgan Ave., Brooklyn 6, N. Y. The unit is said to be particularly well suited for chromium, nickel, and acid copper plating, as well as electroclean-

HOW *Cambridge* WOVEN WIRE CONVEYOR BELTS



REDUCE
Handling--Maintenance

BOOST
Production Rates

This Cambridge Rod Reinforced Belt continuously copper-brazes metal parts at 2050°F. Metal discharge chute is equipped with roller to protect the belt from damage.

The moving belt permits *continuous* treatment or movement without time-wasting stops at machine stations . . . replaces costly manual labor for handling materials. In most cases one loader is adequate to feed the belt.

And maintenance costs fade because Cambridge woven wire conveyor belts are specially engineered from the particular metal or alloy . . . to the particular mesh or weave . . . that best suits your individual case.

FREE BOOK! "Woven Wire Conveyor Belts for Industrial Applications." 56 pages, illustrated, describing Cambridge Belt construction and use. Valuable data for all plant operating men. Write for your copy today!

Call in a Cambridge engineer today to discuss the proper belt type for your plant. There's a Cambridge Sales Engineering Office near you.

Cambridge Wire Cloth Co

Department H • Cambridge, 5 Maryland

SALES OFFICES IN: BOSTON • NEW YORK • BALTIMORE
PITTSBURGH • DETROIT • CHICAGO • SAN FRANCISCO • ST. LOUIS

Whatever your problem in finishing zinc or cadmium, there's an Iridite* to do the job. Iridite, a quick-dip, chemical treatment, offers you these three advantages:

1. EYE APPEALING FINISH . . .
On plated parts Iridite forms a long lasting, sparkling *bright* finish that *stays bright*, even after handling, storage, exposure. On all surfaces, Iridite can be used to produce a variety of colored finishes.

2. RUSTPROOFING . . .
Resistant to the attack of water, gasoline, and ordinary corrosive conditions, Iridite provides the ideal *final finish* for all zinc and cadmium surfaces.

3. BASE FOR PAINT . . .
On any zinc or cadmium surface that must be painted, Iridite insures a better finishing system because the coating improves initial paint adherence, blocks corrosion *under* paint, blocks metallic soap formation *between* paint and metal.

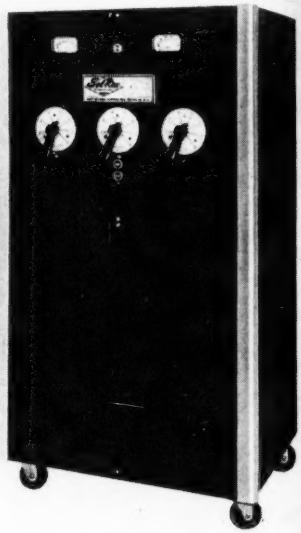
Tell us the type of finish you need for zinc or cadmium — let us tell you how Iridite can help. For information and samples, write to:

ALLIED RESEARCH PRODUCTS, INC.
301 Chemical Building
4004 E. MONUMENT ST. • BALTIMORE 5, MD.
Manufacturers of
IRIDITE
DISTRIBUTORS IN PRINCIPAL INDUSTRIAL AREAS
*REG. U. S. PAT. OFF.

ing and electropolishing.

According to the manufacturer, features of the rectifier include continuous plating control which permits changing tap switch positions without interruption of plating, adequate protection against corrosion, full load efficiency of 72 per cent, positive overload protection in d.c. bus circuit, and positive protection against ventilation restriction.

The rectifier is mounted on ball bearing casters for mobility and provided with doors for quick accessibility for maintenance.

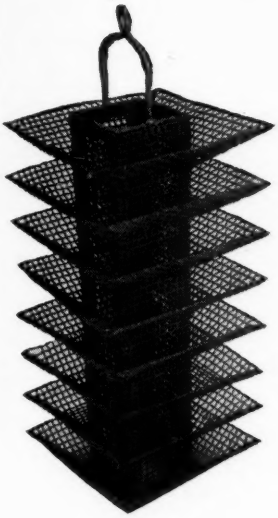


"Sel-Rex" Style 5009 Rectifier

Gerin Heavy Duty Laboratory Centrifuge

A heavy duty hand power centrifuge which is designed to swing two or four 100 c.c. tubes with a minimum of effort has been announced by The Gerin Corp., P. O. Drawer 653, Red Bank, N. J. Features of the unit include ball bearings throughout and a 24-to-1 gear ratio, thus permitting reduced crank speed. The outer diameter of swing is 16 inches, and a stationary guard bowl is provided to reduce air resistance and to protect the op-

ROLOCK
PROCESSING CARRIERS



Many metal working plants, quick to adopt the latest manufacturing operations to boost output, lose this competitive advantage by neglecting handling equipment. The "step-up" machinery is "stepped down" by inefficient processing and finishing methods.

Rolock breaks the handling bottle-neck by custom-designing Carriers, crates, baskets, racks, trays, fixtures, etc. for each specific job or cycle . . . to resist required exposures, take rough treatment, handle easily. Like this wire mesh steel descaling basket, so designed that the center well facilitates flushing and draining, all Carriers are built of the best material available for resistance to expected operational abuses . . . give long hours of service at lower cost.

Rolock engineers will gladly help with your handling problems . . . write for practical suggestions today.

ROLOCK, INC., 1400 KINGS HIGHWAY, FAIRFIELD, CONN.

23 RL 48

CUSTOM-BUILT for Better Work, Easier Handling, Lower Cost

Gerin Heavy Duty Laboratory Centrifuge

erator from whirling parts. The entire unit can be stowed in the bowl when not in use.

The Gerin Heavy Duty Laboratory Centrifuge is said to be ideal for many tests in plants processing or using paints, petroleum products, and so on, and for g eral laboratory uses involving precipi tion, sedimentation, or extractions.

Indubond No. 82

A strippable film for the protection machined, polished, or plated surfac from corrosion and mechanical dama during shipment or storage and fr die and draw marks and fabricati scratches during metal forming oper tions has been announced by Industri Lining Engineers, Inc., Sewickley, Pen sylvania.

Known as Indubond No. 82, the mat rial is said to produce a flexible resi ient film of controllable thickness fro 2 to 10 mils in one application. Accordi to the manufacturer, the material wi withstand the usual impact experience in metal working, shipping, and storag but will strip off readily when the pro tected part is ready to be placed in se vice. The film is said to contain an anti rust inhibitor and to be unaffected b sunlight, heat, moisture, oils, acids, a alkalis. The adhesion can be controlle to the degree desired by the amount o heat used in application, it is claimed.

DRAWCO GRAINLOCK
DRAWING COMPOUND & POLISHING-WHEEL CEMENT
two of the oldest names in the field
INDUSTRIAL LUBRICANTS COMPANY
5736 TWELFTH STREET DETROIT 8, MICHIGAN

SOL-KLEAN

Phosphoric Acid Metal Conditioner

PREPARES METAL FOR PAINTING

- *CLEANS METAL—Removes oil, rust and corrosive agents.*
- *BONDS PAINT—Etches metal and coats with phosphate.*
- *SAFE—Non - inflammable, non - toxic, non-corrosive.*
- *EASILY USED — Adaptable to your plant's facilities.*
- *APPROVED—Wide usage for many years.*
- *MEETS GOVERNMENT SPECIFICATIONS*

INDUSTRIAL CHEMICAL PRODUCTS CO.

3779 Bellevue Ave.,

DETROIT 7, MICHIGAN

Kemclad Appliance Finishes

A series of industrial finishes, known as Kemclad Appliance Finishes, has been developed especially for household appliance products by the Sherwin-Williams Co., 101 Prospect Ave., N.W., Cleveland 1, Ohio. The new products are employed following special systems of application engineered by the company's paint chemists to provide maximum effectiveness.

According to the manufacturer, Kemclad Appliance Finishes possess the following features: ease of application, effective opacity, economy of application, baking range making possible application to various types of products; color stability and retention, resistance to fruit acids, beverages, food, and alkali; good adhesion, resistance to mechanical damage, and resistance to humidity and soap-water immersion. It is claimed that the finishes produced through the use of the Kemclad Appliance finishing system will withstand a temperature of 400 deg. F. for a short time and therefore are well suited for products such as ironers, roasters, and stoves.

The system includes formulas for high bake application, for low bake application and for air drying on products finished by that method.

UNISOL

PAINT STRIPPER

A NEW DEVELOPMENT FOR INDUSTRIAL PAINT STRIPPING

- Non Inflammable
- Used Cold
- Requires No Rinse
- Works Rapidly on All Types of Finishes
- Will Not React or Affect Any Metal, Ferrous or Non-Ferrous
- Non-Injurious to Hands or Clothing
- Unisol Liquid—For Dipping, Dries Rapidly With No After Film to Interfere With Repainting

Samples and further information supplied on request.

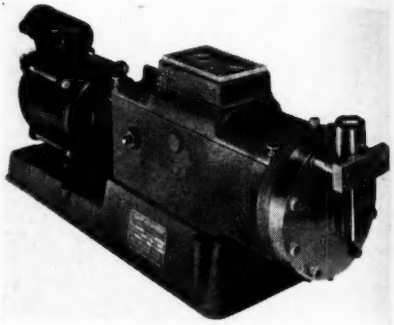
CHEMCO PRODUCTS COMPANY

Incorporated

1059 EAST SEVENTY-SIXTH STREET
CHICAGO 19, ILLINOIS

Lapp CP Model Pulsafeeder Pump

Designated as the Lapp CP Model Pulsafeeder Pump, a porportioning pump suited to a wide range of applications in



Lapp Pulsafeeder Pump

industrial processing, including the metering of acids and other agents in continuous plating, has been announced by the Lapp Insulator Co., Inc., Process Equipment Division, 763 Maple St., Le Roy, N. Y. The unit is a combination piston-diaphragm pump and is said to incorporate the operating advantages of positive displacement, measured feed, and complete isolation of chemical from pump parts.

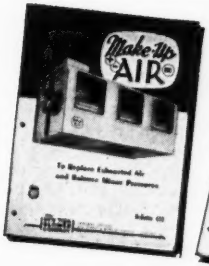
Four sizes of the CP Model Pulsafeeder Pump are available, and duplex, triplex, and other multiple head arrangements for continuous blending or feeding may be obtained.

Ronaflex Improved Flexible Tubing

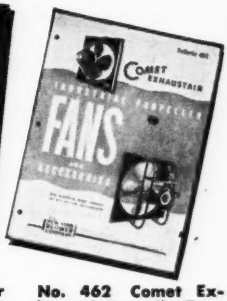
According to an announcement made by the Ronaflex Tubing Co., Inc., Packard Bldg., Philadelphia 2, Pa., the dependability and life of its wire-braid flexible tubing have been greatly extended through the use of new Buna and Neoprene base synthetics which are designed to withstand high temperatures, pressures, vibration, internal and external corrosive solvents, and fumes. With the improved tubing, not only is the useful life said to be increased many times, but leakage and maintenance troubles are

No. 461 Type GI Industrial and Heat Fans. For dust and gas removal, conveying materials, and handling of hot air and gases in industrial processes. 13 sizes. 450 CFM to 60,500 CFM.

No. 463 General Purpose (Jeep) Fans. Portable, self-contained units for Class I Industrial and Ventilating applications. Direct connected and belt driven models. 8 sizes. 400 CFM to 18,000 CFM.



No. 453 Make-Up Air Unit. To replace exhausted air and balance minus pressures. Outside air is warmed, cleaned and delivered in definite quantities to balance known loss. 4 sizes. 5000 CFM to 20,000 CFM.

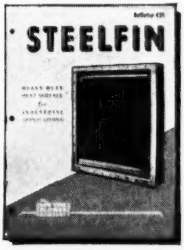


No. 462 Comet Exhaustair Propeller Type Fans. For handling large volumes of air at low resistance. 8 sizes. 400 CFM to 22,000 CFM.

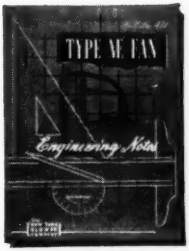
"It's in the AIR"

Are you using AIR to the best advantage in your production methods? To cut costs, increase efficiency, reduce absenteeism, safeguard health, bring comfort to workers? Air efficiently applied to process control makes possible precision manufacture and more uniform products.

When working on your air handling problems, you should have these new bulletins with their complete engineering data at hand. Any or all sent promptly upon request.



No. 451 Steelfin. Heavy Duty Heat Surface. For industrial applications. All steel welded construction. Suitable for continuous heating service on steam pressures up to 150 pounds.



No. 471 Type ME Centrifugal Fans. With slow speed or medium speed wheels with non-overloading horsepower characteristics for heating, ventilating, air conditioning or industrial applications. Capacities up to 101,000 CFM. Certified ratings.

No. 454 Comet Unit Heaters. Welded steel fin-and-tube heating element guaranteed to withstand high steam pressures. 9 sizes. 31 Mbh to 300 Mbh.

The NEW YORK BLOWER COMPANY

GENERAL OFFICES
3166 SOUTH SHIELDS AVENUE • CHICAGO 16

FACTORIES at LA PORTE, IND. and CHICAGO, ILL.

claimed to be eliminated. According to the manufacturer, ¼-inch tubing will withstand bursting pressures up to 1,000 p.s.i. and larger sizes porportionally less.

The rugged lightweight couplings provided with the Ronaflex Improved Flexible Tubing are constructed for quick and easy snapping on or off and are designed to provide a tight positive grip which is claimed to eliminate all trouble due to leaking joints. The tubing is available in standard sizes from ¼ to 2 inches I.D. and a complete range of lengths up to 200 feet in the small diameter and 50 feet in the larger diameters.

Divine "Beltflex" Contact Wheel

Known as the "Beltflex," a contact wheel for abrasive belt polishing has been announced by the Divine Brothers Co., 200 Seward Ave., Utica 1, N. Y. According to the manufacturer, the wheel features controlled balance and density and is designed to provide a smoothly ground surface which makes for uniform belt tracking.

The Beltflex Contact Wheel is available in two degrees of density; namely, Type "E" with unusual degree of flexibility, and Type "G" featuring flexibility with aggressive cutting action. The wheel is balanced to operate smoothly, thus providing a constantly accurate pressure to the working surface, it is claimed. The flexibility of the wheel permits light contour work to be efficiently handled. The wheel is available in face widths and diameters to meet most requirements and is recommended for use with J weight (jeans cloth) abrasive belts.

Divine "Beltflex" Contact Wheel

Acid Pail

A five-gallon pail made of perforated steel with welded seams and covered, inside and out, with rubber permanently wedded through the perforations is now being manufactured by Automotive Rubber Co., Inc., 8601 Epworth Blvd., Detroit, Michigan.

This utensil is described as unbreak-

HOLLAND SAYS:
DEBURRING WILL CUT GRINDING COSTS
Motor Driven Tilting Tumbling Barrels for cleaning, polishing, grinding, deburring, sanding, burnishing. Same unit can be used for Japanning Process when interchangeable cylinder is attached.
Wide selection of metal finishing equipment on hand. Write for FREE folder "M."
J. HOLLAND & SONS, INC.
MANUFACTURERS • DEALERS
276 SOUTH NINTH ST. • BROOKLYN, N. Y.

GOLD PLATING SOLUTIONS
In All Colors
Guaranteed 100% Pure Gold Content
Troy Weight - Color Constant
Tarnish Resistant
Proven Quality by the Acid Test
Write or call our experts about your plating problems
Davis-K-Products Co.
54 West 22nd St., New York 10, N. Y.
Oregon 4-4108
4-4109

Acid Pail

able and is designed for safe handling of acids and all corrosive solutions. It is shaped so as to decrease the likelihood of fluids splashing or spilling. The bail or handle is completely rubber covered. A pouring dip is formed on the edge and a tipping handle is provided at the base to make pouring easy and safe.

Advance Kum-Klean Skin Protector

Production of Kum-Klean, a skin protector for paint shop and other industrial workers, has been resumed by the Advance Paint Co., Indianapolis, Ind. Its manufacture was discontinued during the war years due to the unavailability of the proper ingredients.

Kum-Klean was formulated more than twelve years ago for use by the Advance Paint Company's own employees. It proved so effective that it was put on the market for workers in all types of manufacturing establishments where paint, grease, oils, and chemicals are used.

According to the manufacturer, Kum-Klean, rubbed into the hands before beginning work, protects the hands from harmful chemicals, paints, or varnishes. When work is completed, grease, paint, and oils are easily washed from the hands in water. Kum-Klean is not soluble in paint or varnish reducer, and for that reason is particularly effective for use in paint shops and finishing rooms, it is claimed. The ingredients used in formulating Kum-Klean are said to help prevent dermatitis.

Metal-Clean Water-Displacing Compounds

Two water-displacing products, known respectively as Metal-Clean No. 11 and Metal-Clean No. 12, have been announced by the Metal-Clean Solvent Corp., 1935 N. Paulina St., Chicago, Illinois.

Designed to produce a positive moisture-free surface on all metals (ferrous and non-ferrous), these liquids are said to lift water droplets instantaneously and leave a protective film on the work. Water thus displaced drops to the bottom of the tank where it can be drawn off periodically. Fingerprints are neutralized and water stains prevented, it is claimed.

Metal-Clean No. 11 is used as a cold dip and requires no further blending, agitation, or control of any kind. Metal-Clean No. 12 is applied by either a cold dip, brush, or spray operation.

Al-Tex Plastic Enamel

A synthetic plastic coating material known as Al-Tex has been announced by the Al-Tex Products Co., 1614 Coutant Ave., Lakewood 7, Ohio.

EFFICIENT

▶For production Chromium Plating the anode has to be efficient . . . M Sterling *Dated* Conducta-Core Lead Alloy Anodes are efficient Suppose more than 1% of your work in the tank is spoiled, and you are using Conducta-Cores—let us know, it's news to us; we will make it right for you. Write for full details. Buy *dated* anodes, proof of long life.

Pat. Pend.

Conducta-Core . . . the oomph Anode

Metallurgical Products Co.
Established 1909
35th & MOORE STS. • PHILA. 45, PA.

According to the manufacturer, Al-Tex, a synthetic plastic for use on metal products and various household items, is a free-flowing, self-leveling, high-solid, hard yet elastic enamel possessing exceptional adhesion and durability. It is said to be free from powerful solvents, will not lift any type of primer or surfacer, and is fomulated so as to minimize checking or peeling. Al-Tex Enamel will withstand water, soap, alkalis, acid salts, fumes, and temperature changes, as well as impact damage, it is claimed.

Al-Tex Enamel is manufactured in a variety of colors for each of the several specific applications.

DuBois Tank-O-Meter

Both the gallon capacity of a tank and the number of pounds of material to be charged into a tank to secure a certain concentration may be calculated quickly and easily through the use of the DuBois Tank-O-Meter shown herewith. The Tank-O-Meter is a combination of sliding scales with fixed scales so that it can be set for length of tank, width of tank, and depth of tank, and the capacity of the tank read directly. Likewise on the reverse side of the Tank-O-Meter ounces per gallon desired may be set on one scale and the total pounds of material required read directly opposite the proper tank capacity figure.

DuBois Tank-O-Meter

The DuBois Tank-O-Meter may be obtained by writing to The DuBois Co., Industrial Division, 1120 W. Front St., Cincinnati 3, Ohio.

CUT DOWN REJECTS
WITH
ORVUS
IN YOUR METAL CLEANING BATHS
You'll find this synthetic detergent effective
—as a wetting agent
—as an emulsifier
—in dispersing lime soaps which might cause poor plating if allowed to deposit on the metal
—in speeding rinsing — minimizing water marks
Write for further information about Orvus to
PROCTER & GAMBLE • Cincinnati 2, Ohio

Belke Electric Carboy Acid Pump

Designed to facilitate the removal of acids, alcohols, bleaches, and other liquids from glass carboys, as well as to minimize the hazards involved in the operation, the Belke Electric Carboy Acid Pump has been announced by the Belke Manufacturing Co., 947 N. Cicero Ave., Chicago 5, Illinois.

According to the manufacturer, the pump is light in weight and has a convenient handle so that it may be moved from one carboy to another easily. A 110-volt, 60-cycle, a.c. motor, which can be plugged into any standard electrical outlet, drives a compressor which provides air pressure to force the liquid out of the carboy. The only part of the unit which is in contact with the fluid being pumped out of the carboy is the pipe. It is available in lead, hard rubber, or Saran, and may be replaced readily, it is claimed.

In operation, the Belke Electric Carboy

Acid Pump is placed in a carboy, from which the stopper has been removed. The self-sealing rubber pump connection seals the neck of the carboy. When the motor is switched on, the compressor builds up air pressure in the carboy, and forces the fluid out through the pipe. The flow of fluid can be stopped by pressing the "flow stop" lever. A pressure release valve prevents the air pressure in the carboy from becoming excessive.

Cesco "Spec-Lite" Goggle

Designated as the Cesco "Spec-Lite," a goggle which is designed to provide for maximum safety and comfort is announced by the Chicago Eye Shield Co., 2300 Warren Blvd., Chicago 12, Ill. The construction of the goggle includes a forehead rest and balanced temple suspension which are said to practically "float" the Spec-Lite in position.

Weighing only 1 ounce, the Cesco Spec-Lite Goggle is designed to provide for unusual coverage up and down and to laterally protect the entire eye area from sparks, light impacts, liquid splashes, and other hazards. The goggle also features quick adjustability for correct fit on various faces. The sturdy one-piece plastic lens is quickly and easily replaceable and is said to provide for distortion-free visibility. Designed to permit comfortable wear over personal glasses, the Spec-Lite is available with either clear or glare-reducing green plastic lenses.

Cesco "Spec-Lite" Goggle

FASTER REFINISHING WITH
ELECTRO COLD STRIPPER

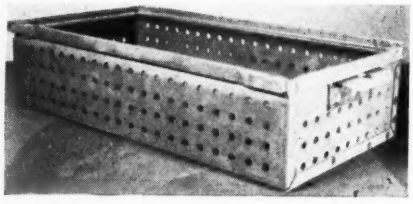
▶ No more long waits while slow-acting paint removers do their work like a team of lumbering oxen. Simply dip the article into Electro Cold Stripper and—Presto!—you can see the old finish literally "pop off" before your eyes. Wash with a pressure stream of water or wipe well with rag and REFINISH IMMEDIATELY. No fuss, no waiting, no bother.

▶ Used cold. Non-inflammable. Non-injurious to hands or metal when used as directed.

▶ Removes paints, enamels, synthetics, lacquers and wrinkles in minutes—not hours. Especially effective on hard-to-remove baked-type finishes. Will not harm even precision finished aluminum, copper, brass, magnesium, zinc, steel, cast iron or their alloys in time required for removal of paint film.

Write for sample and quotations—or order 5 gallons at drum price.

ALLIED FINISHING SPECIALTIES CO.
2637 W. GRAND AVE. · CHICAGO 12, ILL.



Perforated Steel Box for Washing and Degreasing

Perforated Steel Box for Washing and Degreasing

A perforated steel box for washing and degreasing has been announced by the Rack Engineering Co., Pittsburgh, Pa. Constructed of heavy duty steel, this shop box with perforated bottom and sides is designed for washing and degreasing manufactured parts and products of a wide variety of sizes and shapes.

Manufactured in six standard sizes, the box is said to be adaptable to any type of industrial degreasing or washing operation.

ALLWOOD

"Vienna Brand" Lime

Made from Limestone that is identical in chemical analysis and geological structure with European Imported Lime. Tests show a "lime cake" made from Allwood "Vienna Brand" Lime equals the finish made from imported lime.

WRITE FOR FULL PARTICULARS

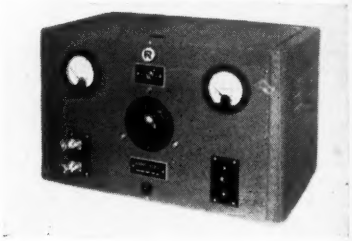
ALLWOOD LIME COMPANY

Manitowoc • Wisconsin

Rapid Model No. 5515 Selenium Rectifier

Featuring an extra large full wave bridge selenium rectifier stack, a 50-ampere rectifier with positive input and output dual overload control, designated as the Model No. 5515, is now being marketed by the Rapid Electric Co., 2847 Middletown Rd., Bronx 61, N. Y. The voltmeter and ammeter of the unit are accurately calibrated from 0 to 15 volts.

The Rapid Model No. 5515 Selenium



Rapid Model No. 5515 Selenium Rectifier

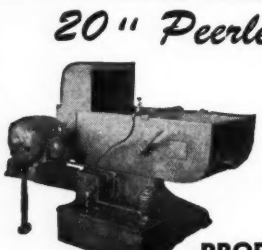
Rectifier is available complete with a heavy duty input line and plug to eliminate installation problems and requires a bench space of only 12 x 20 inches. Other models ranging from 25 to 500 amperes for single and three-phase service can also be obtained.

Bull Buffer

A ruggedly constructed buffing tool for polishing and sanding metal and wood, designated as the Bell Buffer, is now being marketed by the E. R. Bertram

***20" Peerless* Horizontal Belt Surfacing Machine**

WET OR DRY



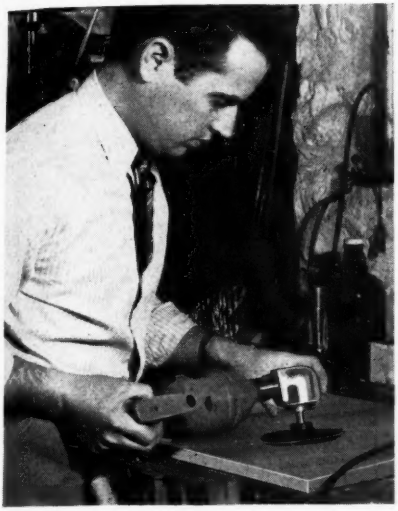
Here's a larger, heat-resistant surfacing machine for higher production, greater accuracy, less opeator fatigue—at reduced costs.

20" x 30" working surface for handling large work. Can be used wet or dry. Also made in 14" size.

Send drawings or samples for estimates.

PRODUCTION MACHINE CO. • GREENFIELD, MASS.

Engineering Co., 3034 Main St., Kansas City, Mo. Said to fit any chuck on an electric drill (or flexible shaft), the tool can be quickly attached and detached and is claimed to be unusually easy to use. Holding the drill stationary, the operator can turn the buffer in a complete circle



Bull Buffer in use

while in use. The flexible rubber disc enables the user to reach hard-to-get-at surfaces.

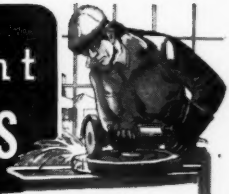
According to the manufacturer, the gear ratio of the Bull Buffer provides added power to the hand drill. The construction of the tool includes a sturdy aluminum casting which houses self-lubricated bearings and steel gears that operate in a bath of oil. The buffer is available complete with a 5-inch rubber disc, sheepskin bonnet, and two sanding discs.

Grab-It Work Gloves

Grab-It All-Purpose Work Gloves have been announced by the Edmont Manufacturing Co., Coshocton, Ohio. The gloves are fabric lined with a natural rubber rough finish and are said to provide maximum comfort and wear resistance.

Grab-It Work Gloves are available in

Edmont GLOVES



made to take the tough, daily grind!

For product finishing and preparation, there's an Edmont fabric-lined, rubber-coated glove to fit your needs. Many years of experience in industry proves they outwear ordinary gloves many times over. Check these principal features:

- Curved fingers molded in natural position.
- Soft high tensile inner fabric.
- Uniform narrow seams for maximum hand comfort.
- Waterproof dirt-proof, snag-proof.

Sizes available for men and women in knit wrist style or with gauntlet in a variety of lengths.

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Edmont

Fabric Lined RUBBER GLOVES

Edmont Mfg. Co., 509 Orange St., Coshocton, O.

the two styles illustrated, No. 660 (left) rubber coated all over and No. 60 (right) with fabric ventilated back, as well as No.

Grab-It Work Gloves

909 with smooth finish Neoprene coating all over, and No. 93 with ventilated back and Neoprene coated palm.

Gunk "P-92" Self-Emulsifying Solvent Cleaner

A high-boiling, non-phenolic type, self-emulsifying and self-scouring solvent concentrate has been announced by The Curran Corp., South Canal St., Lawrence, Massachusetts.

Designated as "P-92," the concentrated solvent may be distinguished from Gunk "P-96" by a characteristic lilac odor markedly different from the characteristic "health soap" odor of the "P-96." One volume of P-92 may be diluted with 10 volumes of kerosene or liquid diesel fuel distillate to form the proper cleaning mixture. It is claimed that the cleaning mixture effectively washes and degreases metal surfaces, leaving them free from dirt and dust-catching film.

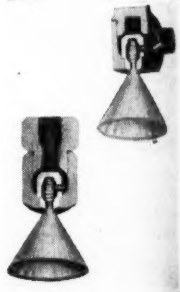
According to the manufacturer, Gunk solvents spontaneously form a safe oil-in-the-water milky emulsion which is free rinsing and presents no fire hazard in drains and sewers.

Gunk P-92 is available in gallon cans, 5-gallon drums, 30 and 50-gallon drums which are not subject to deposit or return.

Whirljet Abrasive Spray Nozzle

The tungsten carbide spray nozzle illustrated herewith, known as the Whirljet, has been produced by the Spraying Systems Co., 4201 W. Lake St., Chicago, Illinois.

The Whirljet Nozzle, producing a hollow-cone spray pattern, is said to produce good resistance to wear when used with liquids containing abrasive particles. The vortex chamber as well as the orifice insert are made of tungsten carbide. The nozzle body and retainer cap are made of 18-8 stainless steel.



Whirljet Abrasive Spray Nozzles

Oakite Composition No. 97

An emulsifiable solvent cleaner that can be diluted with water for efficient cleaning of metal parts in pressure spray-type washing machines has been an-

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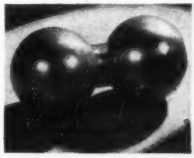
nounced by Oakite Products, Inc., 20 Thames St., New York 6, New York.

Designed for use in large-scale production cleaning installations, Oakite Composition No. 97 forms water emulsions suitable for spray application in single or multi-stage metal washing machines for cleaning steel, brass, aluminum, zinc, and other metals before electrocleaning or prepaint treatment or between processing operations. According to the manufacturer, extensive shop and factory tests on sheet metal and die castings have demonstrated that Composition No. 97 will remove buffing compounds, mill and slushing oils, other rust-preventives, cutting and machining oils, metal chips, and shop dirt.

Reported features of Oakite Composition No. 97 are: (1) its surface - active agents speedily penetrate and loosen deposits so that they readily flush away under the impact of cleaning and rinsing sprays; (2) at recommended concentrations it shows no tendency to foam; (3) since the emulsions do not hold soils in permanent suspension, their effective life is prolonged and nozzle-clogging reduced; (4) a temporary rust-retarding film remains on work; (5) added to rinse water in small quantities, material minimizes water-spotting; (6) the water emulsions present no fire hazards and do not give off toxic vapors; and (7) solid-particle dirts are effectively removed.

Udylite Twin Zinc Ball Anode



Udylite Twin Zinc Ball Anode

A twin zinc ball anode of distinctive design has been announced by the Udylite Corp., Detroit 11, Mich. The twin unit has been designed to secure high operating efficiency, it is claimed.

The twin zinc ball anode is cast by a high production method resulting in manufacturing economies which are passed along to the user.

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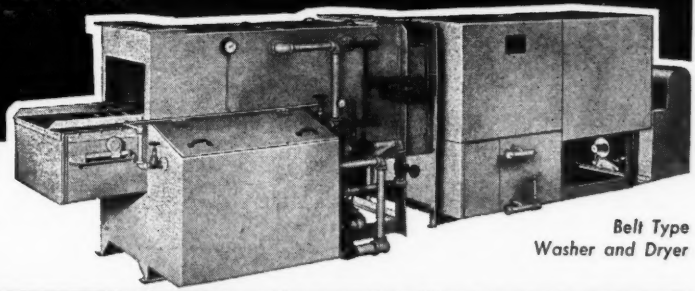

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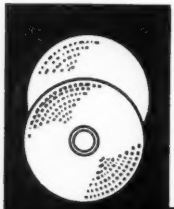
New Literature

"Klad Kote Corrosion Preventives" is the subject of a four-page specification sheet on corrosion preventives prepared and distributed by the Aviation Chemicals Division, R. M. Hollingshead Corp., Camden, N. J. The sheet lists various types of corrosion preventives, identifies them by their U. S. Government designations, describes their characteristics, lists their uses, explains the methods of application and removal, and finally specifies the protection requirements for each type. Copy free upon request.

"Improved Lighting" is the title of a six-page folder now being distributed by The Fostoria Pressed Steel Corp., Fostoria, Ohio, which discusses how improved lighting increases production and decreases operating costs. The folder recommends a procedure for lighting, provides a guide for foot-candle levels, presents illustrations of various lighting applications, and contains illustrations and descriptions of various models of lighting fixtures designed to fit particular requirements.

Copy of the folder, together with a 12-page pocket-size booklet entitled "Balance Lighting—What It Is and Why You Need It," is available free upon request.



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Striplastic No. 320. A bulletin describing the properties and applications of Striplastic No. 320 is available from The Striplastic Co., 10828 Quebec Ave., Cleveland 6, Ohio. Copy free upon request.

Aluminum Sheet and Plate. The Reynolds Metals Co., Louisville 1, Ky., has released a booklet containing 48 pages of technical information relative to various sheet and plate alloys, gauges, and sizes. Beginning with a brief discussion of cost factors, the booklet goes into a careful comparative analysis of costs of aluminum sheet and plate as against other widely used metals. From the section on cost factors, the booklet proceeds into short summaries of such topics as formability, weldability, riveting and joining, brazing, soldering, machineability, and resistance to chemical attack, with a short discussion of the alloys most suitable. Finishes for aluminum sheet and plate, characteristics of the metal, and the problem of avoiding distortion are likewise summarized briefly.

A series of sections in the booklet are devoted to such topics as definitions, identifications, packing, commercial sizes, and Reynolds mill standard sizes. A section is used to list ordering data, while still other sections present tabular information on such topics as the specified chemical compositions, specified mechanical properties, typical mechanical properties, commercial tolerances, and bend radii. In addition, the booklet includes a rather large section containing tables for computing accurately the weight of various sizes and thicknesses of sheet and plate items. Also listed in the weight tables are figures for calculating the weights of a variety of sizes and thicknesses of aluminum circles. One of the final sections of the booklet includes an index of specifications.

The Reynolds Aluminum Sheet and Plate Booklet is being made available to anyone interested in securing information on aluminum sheet and plate. Requests should be directed to the Reynolds Metals Co., Aluminum Division, Desk 105, 2500 S. Third St., Louisville 1, Kentucky.

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Weksler 8-Inch Recording Thermometer is featured in Bulletin 27a announced by the Weksler Thermometer Corp., 52 W. Houston St., New York 12, N. Y. The two-page bulletin illustrates and describes the various types of recording thermometers available in this size. Copy free upon request.

Egyptian Lacquer Booklet. A booklet entitled "Is There a Better Metal Finish Than the One You Now Use?" has been prepared by The Egyptian Lacquer Manufacturing Co., P. O. Box 444, Newark, N. J. The booklet describes six highly developed clear lacquers for metal and suggests proper uses for each. Both synthetic and lacquer types are listed. Copy free upon request.

Troxide Booklet. "Troxide for Pickling and Bright-Dipping Metals" is the title of a 26-page booklet issued by the Waverly Petroleum Products Co., Drexel Bldg., Philadelphia 6, Pa. The booklet contains information concerning equipment used for pickling with Troxide. Practical pickling data for all the common metals and alloys together with recommended practice are included in the booklet. Copy free upon request.

34th Annual Proceedings of the American Electroplaters' Society. Published by the American Electroplaters' Society, Box 168, Jenkintown, Pa. 308 pages. Illustrated. Cloth binding, board covers. Price, $10.00.

This volume presents a record of the technical sessions of the 34th Annual Convention of the American Electroplaters' Society held in Detroit from June 23 through June 27, 1947. It provides a condensed day-to-day record of the Convention proceedings as well as a detailed presentation of each technical paper and the discussion following the presentation. The various committees of the American Electroplaters' Society are listed, as well as the A.E.S. branches.

A handy table of contents is conveniently provided at the front of the book while the rear of the book contains an index listing papers as to subjects, as well as the names of the various authors.

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Nicholson Industrial Steam Trap. A 12-page bulletin issued by W. H. Nicholson & Co., 136 Oregon St., Wilkes-Barre, Pa., presents illustrated, descriptive, and tabular information on a complete line of steam traps recommended for a wide variety of applications in various industries. Data on traps of bronze, cast iron, and cast steel construction are presented. Copy of Bulletin No. 1947 free upon request.

Flat Top Anode Folder. A folder die cut in the distinctive shape of the recently-introduced Flat Top Anode has been issued by Wagner Brothers, Inc., Dept. K, 432 Midland Ave., Detroit 3, Mich. The two-color four-page folder describes six advantages of the Flat Top Zinc Anode. Copy free upon request.

Interchemical Thickness Gage. A six-page folder describing the Interchemical Direct Reading Wet Film Thickness Gage has been issued by Henry A. Gardner Laboratory, Inc., 4723 Elm St., Bethesda 14, Md. The folder describes the operation of the thickness gage and suggests by means of illustrations several applications of this measuring device. The four ranges of film thickness for which thickness gages have been designed are listed. Copy free upon request.

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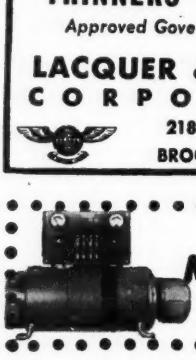
G. E. Rectifiers and Controls. A 28-page illustrated booklet on General Electric's complete line of copper-oxide rectifiers and controls for electroplating, anodizing, electrocleaning, electropolishing, and other electrolytic processes is available from the General Electric Co., Appliance & Merchandising Dept., Bridgeport 2. Conn. The booklet explains the advantages of unit installation of rectifiers and includes technical diagrams and tables for both manually and automatically controlled rectifiers. Copy free upon request.

"Symposium on Paint and Paint Materials" is the title of a 120-page publication issued by the A.S.T.M. Arranged by a symposium committee headed by C. H. Rose, National Lead Company, this technical symposium on paint and paint materials was sponsored by the American Society for Testing Material's Committee D-1 on Paint, Varnish, Lacquer and Related Products. There are ten technical papers, together with a discussion by John C. Moore, on "Test Methods and the Paint Industry." The subjects covered include: "Methods of Evaluation of Industrial Finishes" (R. A. Pringle and E. M. Yacko); "Film Properties of Automotive and Appliance Finishes" (F. G. Weed and N. P. Beckwith); "Metal Container Finishes" (J. H. McKenzie); "Marine Finishes" (A. L. Alexander); "Particle Size by Gas Adsorption" (E. N. Harvey, Jr.); "Interchemical Inclined Tube Viscometer" (M. R. Euverard); and "Stroboscopic Timer for Stormer Viscometer" (E. P. Peterson and J. W. Prane).

A section of the symposium is devoted to statistical problems, with an interesting introduction to statistics by A. E. R. Westman. A paper on "How Paint Technologists Can Use Statistical Methods" by E. I. Stearns, and an interesting case history showing the statistical analysis of test data on accelerated weathering of panels by Roy Hill, George Cook, and W. E. Moyer are given.

The 120-page book can be procured from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., at $2.00 per copy.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"Al-Tex Plastic Finishes" is the title of a folder or "color card" distributed by Al-Tex Products Co., 1614 Coutant Ave., Lakewood 7, Ohio. The color card lists the available colors furnished for the various applications for which Al-Tex Enamels are designed and describes the properties of the products. Copy free.

Plating Barrels. A wide range of plating barrels, from the small single-unit jewelers apparatus to the large multiple-unit production installation, is illustrated and described in an 18-page Bulletin PB-107 prepared by the Hanson-Van Winkle-Munning Co., Matawan, N. J. Copy free upon request.

1948 Catalog of Technical Books has been issued by The Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. The catalog lists the latest books on chemistry, physics, science, technology, petroleum, engineering, metals, technical terms, building construction, and so on. Conforming with the requests of technical and scientific workers and librarians, the catalog gives the date of publication of each book, as well as price, number of pages, detailed descriptions, and full table of contents. Copy free.

American Dustube Catalog. Entitled "American Dustube Dust Collectors" and designated as Catalog No. 72, a publication has been issued by the American Wheelabrator & Equipment Corp., 555 S. Byrkit St., Mishawaka 2, Ind., describing the design and operation of American Dustube Dust Collectors. Copy free.

Du Pont Booklet. A new 14-page illustrated booklet "How You Can Save Money on the Job with Paint Brushes Bristled with Du Pont Nylon," is being distributed by the Plastics Dept., E. I. du Pont de Nemours & Co., Inc., 626 Schuyler Ave., Arlington, N. J. The booklet covers the development of nylon bristles, gives instructions as to the use and care of nylon-bristled brushes and describes recommended procedures for cleaning and reclaiming. It also includes factual data on brush performance and pointers for painting economy. Copy free upon request.

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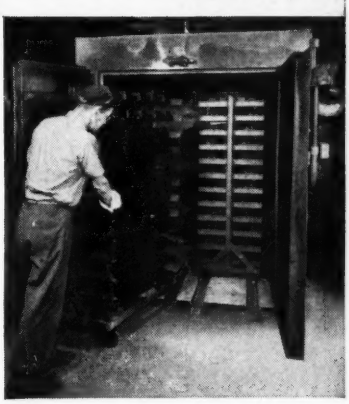

Minneapolis-Honeywell Regulator Co. uses the above Despatch R S Oven for refinishing of controls sent in for repair. The black wrinkle enamel on the relay cover shown is baked to an extremely hard, durable finish in 1 hour at 300° F. saving 7 hours of former air drying time! Other parts are baked ½ hour at 350° F. This fast baking of finishes speeds up the entire repair program, improves service to customers.

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